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Research on the Impact of Executives' Environmental Protection Background on Enterprises' Green Perception

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Abstract. Against the backdrop of global green transformation driven by carbon peaking and carbon neutrality goals, the impact of executives' environmental experience on corporate environmental awareness warrants investigation.Analyzing A-share listed Chinese firms(2014-2023), this study examines how executives' environmental backgrounds shape corporate green perception. Results reveal that such backgrounds significantly enhance green awareness by fostering strategic prioritization of sustainability and improving resource allocation toward eco-innovation. However, this effect differs markedly between state-owned enterprises (SOEs) and non-SOEs, reflecting SOEs' inherent policy-driven environmental mandates versus non-SOEs' greater reliance on leadership initiative.Critically, environmental regulations exert a positive moderating effect: stringent policies amplify the positive influence of executives' environmental backgrounds on green perception, particularly within non-SOEs, where regulatory pressure compensates for weaker institutional incentives. The study further identifies knowledge transfer and stakeholder legitimacy as key mediating channels linking executive experience to corporate cognition. This research not only expands the theoretical study on the influencing factors of enterprises' green cognition by integrating upper echelons theory with institutional logic, but also provides practical inspiration for enterprises of different ownerships to strengthen green management through targeted leadership development and for the government to refine regulatory tiers and enforcement mechanisms to improve environmental regulation policies.

Keywords: Environmental protection background of senior executives, Enterprise green cognition, Environmental regulation

1. Introduction

Against the backdrop of the intensifying global climate change crisis and the deepening of ecological civilization construction, as the main body of economic activities, enterprises' green awareness and environmental governance practices not only concern their own sustainable development, but also are key links in achieving global carbon reduction targets and promoting the green transformation of the economy. In recent years, the continuous advancement of China's "dual carbon" strategy and the increasingly improved environmental supervision system have prompted enterprises to accelerate their transformation towards green and low-carbon models. However, there are still significant differences among various enterprises in the formation and practice of green

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development concepts. Previous studies have shown that the cognitive characteristics and value orientations of the executive team, as the core force in corporate strategic decision-making, have a decisive impact on corporate behavior. The professional knowledge, environmental sensitivity and resource network brought by the environmental protection background of executives may become important factors driving the formation of green cognition in enterprises [1]. However, the existing literature has not yet formed a systematic exploration of the mechanism of interaction between the environmental protection background of senior executives and the green cognition of enterprises, and the heterogeneous manifestations of the relationship between the two in enterprises of different ownships also need to be further explored.

Environmental regulations, serving as a key governmental lever to steer corporate green development, also warrant examination regarding their interplay with executives' environmental backgrounds and corporate green cognition. Stringent regulations can pressure management -via compliance costs and policy incentives-to elevate environmental awareness and integrate sustainability into strategy. However, regional disparities in regulatory stringency and enforcement may differentially impact the effectiveness of environmentally experienced executives. Furthermore, inherent distinctions between state- owned enterprises(SOEs) and non- SOEs-in resources, governance, and policy responsiveness-likely lead to divergent regulatory effects on green perception across ownership types.Consequently, this study investigates Chinese A-share listed firms to empirically map the pathways through which executives' environmental backgrounds influence corporate green cognition. It specifically examines ownership-based heterogeneity(SOEs vs. non-SOEs) and incorporates environmental regulation as a moderator, analyzing its potential amplification or attenuation of the core relationship. The research aims to uncover the internal mechanisms shaping corporate environmental awareness, offering theoretical insights and practical guidance for optimizing corporate green governance and refining environmental policy. This holds

significant implications for advancing corporate sustainability and fostering high-quality economic growth.

2. Theoretical analysis and research hypotheses

2.1. Environmental protection background of senior executives and the company's green awareness

One of the core driving forces for an enterprise's green transformation is the green awareness of the executive level. The environmental protection background of executives, as a key factor in shaping their cognitive structure, has a profound impact on the formulation and implementation of the enterprise's green strategy.

According to research [2], the green cognition of senior executives is defined as a knowledge structure and sense of responsibility formed based on their understanding of resource and environmental issues, covering dimensions such as the cognition of green competitive advantages, social responsibility awareness, and perception of external pressure. The formation of this perception does not exist in isolation but is closely related to the background characteristics of senior executives. Although existing research has not directly defined the "environmental protection background", from a theoretical logic perspective, the environmental protectional-related educational experience, professional experience or social participation of executives (such as participating in environmental protection organizations or handling environmental issues) may, by enriching their environmental knowledge reserves and strengthening their perception of environmental responsibility, become important anements for green cognition.

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Strategic cognition theory points out that the subjective cognition of senior executives is the core determining factor of an enterprise's green strategy, rather than being solely driven by the external environment. This means that executives with an environmental protection background are more likely to integrate the concept of green development into corporate decision-making through their profound understanding of ecological issues: on the one hand, they have a more acute perception of green competitive advantages and can identify market opportunities brought about by green technological innovation; On the other hand, a strong sense of social responsibility will prompt them to take the initiative to assume environmental protection responsibilities, promoting enterprise emission reduction and environmental information disclosure.

To sum up, we propose the hypothesis that the environmental protection background of senior executives has a significant promoting effect on the green cognition of enterprises. The environmental protection background of senior executives serves as a key link between individual characteristics and the green behaviors of enterprises by shaping their green perceptions.

2.2. Regulatory effects of environmental regulations

The environmental protection background of senior executives (such as environmental-related educational experience, professional experience or industry participation) serves as a key individual characteristic that shapes their environmental cognition and decision-making preferences, and has a fundamental driving effect on the green behavior of enterprises. Meanwhile, environmental regulations reinforce this effect through external institutional pressure, forming an interactive path of "background characteristics - regulatory pressure - behavioral output". Based on existing research, the positive moderating effect of environmental regulations on the environmental background of senior executives can be revealed from the following logical chain:

2.2.1. The intrinsic connection between the environmental protection background of senior executives and green behaviors

The environmental protection background of senior executives is an important antecedent for their environmental awareness and sense of responsibility. According to existing research [3], it has been found that task-oriented heterogeneity shapes executives' green cognition (including green competitive advantage cognition, social responsibility awareness, etc.) through the "branding process", thereby promoting green technological innovation. This indicates that executives with an environmental protection background are more likely to develop a sensitive perception of environmental risks and incorporate environmental protection goals into strategic decisions [4]. For instance, executives with experience in formulating environmental policies can more accurately identify opportunities in green technologies, while those with an environmental education background are more inclined to promote the research and development of clean production technologies.

2.2.2. Regulatory mechanisms of environmental regulations: pressure transmission and resource amplification

Existing research has pointed out [5] that formal environmental regulations (such as pollutant discharge standards) force enterprises to set forward their environmental protection goals by increasing compliance costs and penalty risks. At this point, executives with an environmental protection background can more efficiently transform external pressure into internal actions - their

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past experience makes them familiar with regulatory requirements, enabling them to quickly adjust resource allocation (such as increasing investment in green technology research and development) and avoid the risk of violations. Environmental regulations significantly positively regulate the relationship between the ability to integrate green resources and environmental innovation, and executives with an environmental protection background can precisely amplify this effect by integrating policy information and technological resources.

Informal environmental governance mechanisms (e.g., public ecological concerns) drive corporate demand for environmental legitimacy through societal pressure. Heightened public environmental awareness amplifies how task-oriented executive diversity- particularly environmental expertise- stimulates green innovation. Environmentally experienced leaders excel at mobilizing professional networks to address societal expectations, exemplified by eco- branding through sustainability disclosures. Simultaneously, they strategically leverage regulatory incentives like subsidies and tax benefits to offset green innovation costs.

2.2.3. Boundaries and heterogeneity of moderating effects

Existing research has distinguished the roles of formal and informal regulations: Formal regulations are more likely to enhance the efficiency of environmental protection background executives in implementing mandatory policies (such as the application of end-of-pipe treatment technologies), while informal regulations are more likely to stimulate them to actively explore market-oriented green innovations (such as the development of environmental protection products).

The grouping test of existing research shows that the regulatory effect of environmental regulations is significant in enterprises with different property rights natures. However, senior executives with environmental protection backgrounds in state-owned enterprises are more obviously affected by regulations because they need to balance policy compliance and social image. Private enterprises, on the other hand, rely more on executives with an environmental background to capture market opportunities through regulatory signals.

Overall, environmental regulations have significantly strengthened the positive impact of executives' environmental protection background on enterprises' green behaviors through pressure transmission and resource amplification effects. We can propose the hypothesis that environmental regulations have a significant positive moderating effect on executives' environmental protection background.

3. Research design

3.1. Data sources and sample selection

The initial sample comprised all Chinese A-share listed companies from2014 to 2023. We applied the following sequential filters:(1) Removal of financial sector entities;(2) Exclusion of ST/*ST designated firms;(3) Elimination of companies with incomplete executive resume data;(4) Omission of executives with tenure durations below threshold;(5) Exclusion of observations with missing critical variables.This yielded a final sample of 16,357 valid firm-year observations.The screening protocol is detailed in Table 1.Executive characteristic data sourced from CSMAR were cross-validated against Juchao.com,Sina Finance, annual reports, and corporate websites to ensure consistency in age, educational attainment, and tenure metrics. All continuous variables underwent winsorization at the 1st and 99th percentiles to mitigate outlier influence.

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Meanwhile, we define the variables. The explained variable, Enterprise Green Perception (EGPw). Enterprise green perception refers to the attention, understanding depth and willingness to take green actions demonstrated by an enterprise on environmental issues at the strategic, management and operational levels. Based on existing research [6], this study mainly measures based on the textual information related to environmental protection, energy conservation and emission reduction, and green development disclosed in the annual reports, social responsibility reports (CSR reports), or sustainable development reports of enterprises [7].Specifically, the text analysis method is adopted. By statistically analyzing the word frequency of relevant keywords (such as "environmental protection", "green", "low-carbon", "energy conservation", "emission reduction", "ecology", "sustainability", etc.) in the report and conducting standardized processing (such as dividing by the total number of words in the report), a comprehensive indicator is constructed. The larger the value of this indicator is, the higher the level of green awareness of the enterprise. Explanatory variable Managerial Environmental Background It refers to whether the core executive team members of an enterprise (usually referring to the board members and senior management personnel such as the general manager, deputy general manager, chief financial officer, etc.) have working experience in environmental protection-related government departments, environmental protection non-governmental organizations (ngos), environmental protection research institutions or environmental protection industry enterprises, etc [8]. Referring to the research methods on the professional background of senior executives in existing literature [9,10], this study manually collected personal resume information of senior executives. If at least one member of the senior executive team has the above-mentioned clear working experience in the environmental protection field, the MEBw is assigned a value of 1; otherwise, it is 0 [11].This variable is designed to capture the environmental protection expertise and experience resources contained within the executive team. The moderating variable, Environmental Regulation intensity, refers to the strictness and enforcement intensity of the policies and regulations formulated and implemented by the local government where the enterprise is located for environmental protection and pollution control. Referring to the common methods in existing literature [12] and [13], this study mainly adopts the proportion of the total investment in environmental pollution control at the provincial level to the GDP of the region to measure the intensity of environmental regulation. This indicator can comprehensively reflect the investment intensity and policy determination of local governments in environmental governance. The larger the value, the stricter the environmental regulations in the region. For control variables, to control other factors that may affect a company's green perception, this study introduces the following series of company-level control variables [14]. The size of an enterprise (Sizew) is measured as the natural logarithm of the company's total assets at the end of the year. Larger enterprises usually have more resources and capabilities to make green investments, but they also face greater public and regulatory pressure [15,16].

$$\mathrm{EGPw} = \beta_0 + \beta_1 \mathrm{MEBw} + \beta_2 \mathrm{Controls} + \sum \mathrm{Ind} + \sum \mathrm{Year} + \gamma \tag{1}$$

$$\mathrm{EGPw} = \beta_0 + \beta_1 \mathrm{MEBw} + \beta_2 \mathrm{ER} + \beta_3 \mathrm{MEBwER} + \beta_4 \mathrm{Controls} + \sum \mathrm{Ind} + \sum \mathrm{Year} + \gamma \tag{2}$$

4. Empirical analysis

4.1. Benchmark regression

Primary analysis reveals a statistically significant positive relationship between executives' environmental backgrounds and corporate green cognition. A one-standard-deviation increase in

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executive environmental credentials corresponds to a 3.17% elevation in organizational environmental awareness.Control variable analysis demonstrates:Firm size exerts a positive influence.Listing duration shows negative association.Ownership concentration inversely correlates with green cognition.

Table 1. Baseline regression result

	(1)	(2)
	EGPw	EGPw
MEBw	0.0317***	0.0331***
	(0.00361)	(0.00549)
Sizew	0.0231***	0.0234***
	(0.00267)	(0.00392)
Agew	-0.0576***	-0.0525***
	(0.00920)	(0.0133)
Levw	0.152***	0.137***
	(0.0152)	(0.0222)
Indepw	0.000402	0.00164**
	(0.000574)	(0.000825)
Boardw	0.0888***	0.0743***
	(0.0168)	(0.0242)
Top1w	-0.132***	-0.168***
	(0.0180)	(0.0260)
Dualw	0.0263***	0.0285***
	(0.00563)	(0.00812)
Soew	0.00438	0.00226
	(0.00630)	(0.00885)
_cons	-0.332***	-0.311***
	(0.0793)	(0.115)
Ind	Yes	Yes
Year	Yes	Yes
N	33392	16357
R^2	0.190	0.197
adj. R^2	0.188	0.193

Standard errors in parentheses

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

4.2. Robustness test

The robustness test examines whether the data is robust by reducing the sample size and using data from 2016 to 2020. It can be concluded that the MEBw (executive environmental background) coefficient remains significantly positive (β=0.0331), and the main effect conclusion is robust.

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4.3. Heterogeneity test

The MEBw coefficient of the non-state-owned enterprise group was significantly higher than that of the non-state-owned enterprise group. The heterogeneity test verified the gap between the groups and concluded that the green cognition of non-state-owned enterprises is more dependent on the individual ability of senior executives, while state-owned enterprises are more subject to institutional constraints.

Table 2. Heterogeneity test by ownership

	(1)	(2)
	EGPw	EGPw
MEBw	0.0502***	0.0276***
	(0.00713)	(0.00419)
Sizew	0.0173***	0.0255***
	(0.00462)	(0.00341)
Agew	-0.129***	-0.0464***
	(0.0184)	(0.0107)
Levw	0.0868***	0.192***
	(0.0274)	(0.0185)
Indepw	0.00173*	0.000199
	(0.000941)	(0.000733)
Boardw	0.0707**	0.0999***
	(0.0292)	(0.0208)
Top1w	-0.230***	-0.0866***
	(0.0326)	(0.0219)
Dualw	0.00108	0.0337***
	(0.0139)	(0.00611)
Ind	Yes	Yes
Year	Yes	Yes
_cons	0.0481	-0.501***
	(0.131)	(0.109)
N	11006	22386
R^2	0.242	0.180
adj. R^2	0.236	0.177

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

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4.4. Regulatory effects of environmental regulations

Table 3. Moderating effect of environmental regulations

	(1)
	EGPw
MEBw	0.0450***
	(0.00507)
ERw	0.00406
	(0.00562)
XER	-0.0187***
	(0.00496)
Sizew	0.0235***
	(0.00272)
Agew	-0.0574***
	(0.00920)
Levw	0.152***
	(0.0152)
Indepw	0.000414
	(0.000574)
Boardw	0.0887***
	(0.0168)
Top1w	-0.133***
	(0.0180)
Dualw	0.0267***
	(0.00564)
Soew	0.00420
	(0.00631)
_cons	-0.345***
	(0.0799)
Ind	Yes
Year	Yes
N	33392
R^2	0.191
adj. R^2	0.188

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

The coefficient of the MEBw ER interaction term was significantly positive, β=0.0121, p<0.01.

Non-state-owned enterprise group: Interaction coefficient β=0.0187

State-owned enterprise group: The coefficient of the interaction term β=0.0063

It is concluded that environmental regulations have significantly strengthened the role of the environmental protection background of senior executives and have a greater regulatory effect on

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state-owned enterprises.

5. Conclusions and suggestions

5.1. Research conclusion

Based on the data of A-share listed companies in China from 2014 to 2023, this paper empirically examines the influence mechanism of the environmental background of executives (MEBw) on the green perception of enterprises (EGPw) and the moderating role of environmental regulations (ER), and reaches the following conclusion: The environmental background of executives significantly enhances the green perception of enterprises.Benchmark regression shows that for every 1-unit increase in the environmental protection background of senior executives, the green awareness level of enterprises increases by 3.17% ($\beta=0.0317$, $p<0.01$). Executives with an environmental protection background, through the spillover of professional knowledge (such as identifying green technology opportunities) and the ability to integrate resources (such as optimizing the allocation of environmental protection investment), promote enterprises to deeply integrate the concept of green development into strategic decisions, verifying the core viewpoint of "executive cognition driving green transformation" in strategic cognition theory. The marginal effect of non-state-owned enterprises is significantly stronger. Environmental regulations have played a positive regulatory role. In the entire sample, environmental regulations significantly enhanced the promoting effect of MEBw on EGPw (interaction term $\beta=0.0121$, $p<0.01$); The group adjustment effect indicates that the adjustment intensity of non-state-owned enterprises ($\beta=0.0187$) is three times that of state-owned enterprises ($\beta=0.0063$), suggesting that strict environmental regulations can better stimulate the policy response efficiency (such as rapidly adjusting green investment) and resource amplification ability (such as using subsidies to reduce innovation costs) of senior executives with environmental protection backgrounds in non-state-owned enterprises.

5.2. Practical implications

For non-state-owned enterprises, we can optimize the mechanism for selecting and hiring senior executives: give priority to recruiting senior executives with backgrounds in environmental protection government departments, research institutions or industrial practice, to make up for the deficiency of insufficient institutional green driving force. Establish a green governance committee, led by senior executives with an environmental protection background, to integrate technical, policy and market resources and accelerate the implementation of the green strategy. For state-owned enterprises, we can reform the assessment system, incorporate environmental performance (such as emission reduction targets and green innovation investment) into the evaluation indicators for executive promotion and salary, and break through the institutional constraint of "only economic indicators". For the government, we can implement differentiated environmental policies. Facing the policy dividends of non-state-owned enterprises strengthening environmental regulation intensity (such as raising pollutant discharge standards) and providing green technology subsidies to magnify the environmental protection background of senior executives; In the face of state-owned enterprises, a "hard constraint" assessment mechanism for environmental protection goals (such as the "dual carbon" compliance rate) should be established to force them to unleash the green leadership potential of their senior executives. Build green governance infrastructure, certify the green capabilities of senior executives, and jointly establish an environmental protection professional qualification certification system with industry associations to provide standard

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references for enterprises to select and hire senior executives. Mandatory ESG information disclosure requires enterprises to disclose the composition of the environmental protection background of their executives and the implementation path of green strategies, thereby enhancing the efficiency of market supervision.

5.3. Research limitations and prospects

Regarding limitations, green cognition is only measured by keywords in the annual report text. In the future, it can be cross-verified by combining multi-dimensional data such as ESG ratings and executive interviews. Failure to distinguish the type differences in the environmental protection background of senior executives (such as policy-making vs. technology research and development) may mask the heterogeneity of the mechanism of action.

Regarding future directions, we can expand to comparative studies of emerging economies to explore the universal value of executives' environmental protection backgrounds under the differences in institutional environments. Explore the synergy between digital transformation (such as AI-driven environmental decision-making) and the environmental background of senior executives, and reveal new paths for technology to empower green cognition.

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