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How Does Corporate Green Innovation Strategy Translate into Green Innovation Performance Based on Chain Mediation?

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Abstract: Innovation is the engine of economic growth, and green innovation can make this growth sustainable. In the context of tightening resource and environmental constraints and the strategic process of innovation-driven growth, green innovation strategy has become the core element and effective driving force for manufacturing enterprises to achieve green transformation and gain sustainable competitive advantage. Firstly, this paper constructs a research framework of "corporate green innovation strategy (CGIS)—green organization identity (GOI)—employees' green innovation behavior (EGIB)—corporate green innovation performance (CGIP)" based on the natural resource-based view. Second, this paper investigates the impact of CGIS on EGIB and the chain mediating role of GOI and EGIB in this process. The study shows that GIS has a significant positive impact on CGIP. GOI mediates between CGIS and CGIP. EGIB mediates between CGIS and CGIP. GOI and EGIB have a chain mediating role between CGIS and CGIP. This paper analyzes the process mechanism of CGIS on CGIP and provides an intentional reference for manufacturing companies to implement green innovation strategy and improve green innovation performance.

Keywords: corporate green innovation strategy; green organization identity; employees' green innovation behavior; green innovation performance

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1. Introduction

With the national dual carbon strategy of "carbon peak and carbon neutral", promoting energy saving and emission reduction and accelerating the green transformation of enterprises have become the inevitable choice for Chinese enterprises to achieve sustainable development and gain competitive advantages [1,2]. Corporate green innovation, as a new ecological paradigm that focuses on the relationship between corporate behavior and nature in the context of ecological protection [3–5], has become a key path for enterprises to achieve green transformation and sustainable development. In terms of the external environment, the dual externalities of environmental management [6–8], increased consumer awareness of environmental protection, and the strengthening of environmental regulations are factors that externally drive enterprises to incorporate environmental responsibility into their strategic planning [9,10]. In other words, corporate green innovation rises to the level of corporate strategy. Green innovation strategy, as a strategic choice that balances economic interests and environmental benefits, aims to reduce the negative impact on the ecological environment in the production and operation process of enterprises, to achieve systematic innovation in technology and concepts, and thus to improve the green performance and competitive market position of enterprises [11]. However, the implementation of green innovation strategy requires enterprises to increase green investments and carry out green innovation activities, which raises the cost of business operations and reduces the level of performance of enterprises [12–14]. This is contrary to the original purpose of implementing green innovation strategies in enterprises. In addition, although many enterprises have developed and implemented green innovation strategies, they have not

produced the expected green performance. Therefore, in the context of increasingly serious ecological and environmental problems and ecological and environmental security becoming the content of national security strategy, it is of strategic importance to explore how the green innovation strategy of enterprises can be translated into the green innovation performance of enterprises to achieve economic and ecological and environmental benefits.

As a strategic choice that balances economic, environmental and social benefits, green innovation strategy has become an important driving force for enterprises to achieve high-quality development [15]. Therefore, green innovation strategy has also become the focus of academic debate. Currently, scholars have focused their research on green innovation strategies in two main areas. First, we analyze the influencing factors and driving mechanisms of green innovation strategies based on resource-based theory [2,16], stakeholder theory [17], and institutional theory [18]. First, the resource-based theory, stakeholder theory and institutional theory are used as the theoretical basis to study the influencing factors and driving mechanisms of green innovation strategies. According to Galbreath (2019) [19], a firm's sustainable development is guided by the strategic endowment of resources, including specialized routines, dynamic capabilities and organizational assets. Influenced, in particular, by the United nation's sustainable development goals (SDGs), many multinational enterprises are proactively implementing suitable strategies that encourage green innovations to achieve sustainable development [20,21]. The postulation of green innovation as a strategic firm resource may address many social and environmental issues related to sustainable firm practices [22,23]. However, successfully leveraging green innovation as a strategic resource may require buyer-driven knowledge transfer mechanisms and knowledge acquisition capabilities within the firm [24], investment in research and development [23], support from top management to establish technological capabilities [25,26], cross-functional integration within the firm, development of a network of strategic partners, and implementation of green marketing programs [27,28]. However, if enterprises lack pressure from interest stakeholders such as the government, they will make the strategic decision to forgo green inputs to reduce short-term pressure as well as to save resources needed for current competition [29]. Second, on the premise of the strategic significance of corporate green innovation by default, the focus is on corporate performance [30,31], corporate value [32], and the impact on socioeconomic development [33] arising from corporate green innovation strategies.

Although scholars from various countries have conducted a lot of research on green innovation strategies of enterprises, the existing studies still have the following four shortcomings. First, from the perspective of strategic process management, the current research on corporate green innovation strategies mainly focuses on two stages: strategy formulation and selection [34] and the effect of strategy implementation [33,35]. Few scholars have studied green innovation strategies from the perspective of strategy implementation process. Second, current research on the effects of implementing green innovation strategies has focused on indirect effects such as corporate financial performance [30,31,36], market performance [37], and social performance [38]. This ignores the direct purpose of enterprises' implementation of green innovation strategies. The most direct purpose of implementing green innovation strategy is to improve the level of green innovation performance within the enterprise, and finally achieve "win-win" for both economic benefits and environmental benefits. Third, current studies have demonstrated that green organization identity has an impact on green innovation performance through green absorptive capacity [39] and organizational legitimacy [40], but the available studies have not formed a unified opinion. The mechanism of action between green organization identity and green innovation performance remains to be studied in depth. Fourth, employees, as the main body of enterprise innovation activities, are the bridge connecting enterprise green innovation strategy and green innovation performance. They are both the key to the implementation of corporate green innovation strategy and the most direct source to promote the generation of green innovation performance. However, the current research on green innovation behavior is mostly focused on the organizational level and does not pay

attention to the individual employee level. Green organization identity is the unified cognition formed between the enterprise and employees on environmental issues and is the key to achieve organizational and individual unity in the enterprise. It plays an important role in influencing employees to focus on green innovation in order to promote corporate green innovation activities [41]. Employee green innovation behavior is the external expression of employees' environmental awareness, and is an essential link to promote the generation of green innovation performance in the enterprise. In other words, green organization identity and employee green innovation behavior are the key paths for enterprises to enhance green innovation performance internally. However, there are fewer studies on the relationship between green organization identity and employee green innovation behavior in corporate green innovation strategy and green innovation performance. Additionally, the research on the influence of green organization identity on employees' green innovation behavior also needs to be further developed.

Based on the shortcomings of the current research, this article constructs a research framework of "corporate green innovation strategy-green organization identity-employee green innovation behavior-green innovation performance" to investigate the process mechanism of improving corporate green innovation performance through green innovation strategy, from the perspective of a natural resource-based view. By analyzing the role of green organization identity and employees' green innovation behaviors in mediating the chain between corporate green innovation strategy and green innovation performance, the "black box" between corporate green innovation strategy and green innovation performance is uncovered from within the organization. This will provide some thoughts for the implementation of green innovation strategy and the improvement of green innovation performance of enterprises.

This study is structured as follows: Section 2 provides brief literature reviews on corporate green innovation strategy, green innovation performance, green organization identity, and employee green innovation behavior, which are used as the basis for the basic hypothesis of the study. Section 3 describes the method, data sample collection techniques and the measurements for all variables. Section 4 examines the validity and reliability of the scales and presents descriptive statistics, correlation analysis, and regression analysis. Section 5 presented the conclusions and the implications of this study. Finally, Section 6 points out the limitations of this study and presents research perspectives.

2. Literature Review and Hypothesis Development

2.1. Corporate Green Innovation Strategy and Green Innovation Performance

The concept of corporate green innovation strategy has its roots in environmental strategy, first proposed by Driessen and Hillebrand (2002). The concept was introduced without any certainty that environmental benefits would be generated. In other words, corporate green innovation strategies are not proposed for the purpose of reducing the burden on the environment. However, it yields several important environmental benefits. Therefore, this is one of the important reasons why corporate green innovation strategies have become a hot topic of research in the field of strategic management. Chen (2006) [42] defined corporate green innovation strategy as the software or hardware innovative activities related to the green processes or products, like innovative technologies involved in preventing pollution, energy-saving, waste-recycling, designing green products, or even corporate environmental management. It has also been argued that a firm's green innovation strategy is the development of innovation strategies and decisions that associated with the green process and green products, as well as the management system associated with green activities and environmental engagement [9,43,44]. Green innovation strategy emphasizes that enterprises adjust their production and operation processes to reduce environmental pollution through green innovation activities within the enterprise in order to obtain economic benefits and environmental benefits. Therefore, the vast majority of scholars believe that an enterprise's green innovation strategy will enhance green innovation performance. Compared to enterprises without green innovation strategies,

enterprises with green innovation strategies will go through strategies to obtain certain environmental performance [45]. Green innovation strategy is an important factor for enterprises in environmental protection and business operations and is a facilitator in maintaining a balance between the two [46]. What is more, green innovation valuable as an enterprise resource for establishing competitive advantage has the potential to address the dilemma between consuming available resources and preserving them for the future [47]. Through green innovation strategies, enterprises can integrate environmental issues into their business operations, promote technological renewal and process innovation within the enterprise through resource matching, and improve their competitive advantage and thus gain environmental benefits [48].

However, there are some scholars who argue that corporate green innovation strategies do not necessarily promote corporate green innovation performance. They argue that improving green innovation performance requires significant cost investment and that the improvement in green innovation performance is not immediately apparent in a short period of time compared to the cost reduction brought about by a green innovation strategy. Moreover, the benefits of improved green innovation performance do not offset the costs of adopting a green innovation strategy [49]. In an uncertain environment, it can even have the opposite result and affect the environmental performance of the enterprise.

This paper argues that an enterprise's green innovation strategy will have a catalytic effect on green innovation performance. On the one hand, the impact of corporate green innovation strategy on green innovation performance is continuous, and its effect may not be obvious or even produce a negative impact in a short period of time. However, in the long run, the green innovation strategy can help enterprises establish a perfect green innovation system and promote the green innovation activities within the enterprises, so as to improve the green innovation performance of the enterprises. On the other hand, it is too one-sided to analyze the impact of corporate green innovation strategy on green innovation performance purely from the perspective of cost. Through the implementation of green innovation strategy, the "green" allocation of internal resources of enterprises can be innovated, and the awareness of green innovation of enterprises can be enhanced, which in turn can facilitate the improvement of green innovation performance. Hence, the subsequent hypothesis was developed:

Hypothesis 1 (H1). *Corporate green innovation strategy positively affects the corporate green innovation performance.*

2.2. The Mediating Role of Green Organization Identity

The natural resource-based view argues that the resources and capabilities acquired by firms enhance their green innovation performance [50]. Green organization identity is a special resource that enterprises acquire. It can enhance green innovation performance by combining an enterprise's business philosophy with employees' perceptions, which in turn can influence their behavior. However, previous studies have neglected the impact of green organization identity on green innovation performance [51]. Green organization identity is based on organization identity, combined with the green concept, so that employees and the enterprise in the environmental aspects of the cognitive consistency. In other words, green organization identity is the integration of individuals and organizations on environmental issues. Additionally, the mediating role of green organization identity, as an important factor of environmental management within the firm, between the firm's green innovation strategy and green innovation performance needs to be further investigated.

Corporate green innovation strategies can contribute to the formation of a green organization identity [39]. An enterprise's green innovation strategy has an impact on the perceptions of its members by adjusting its production operations to reduce environmental pollution. On the one hand, the environmental awareness and measures conveyed by the enterprise in the process of adjusting its production and operation methods can make the members of the organization feel the contribution made by the enterprise to reduce

environmental pollution, and thus create a sense of identity and belonging to the enterprise. On the other hand, when members of the organization identify with the enterprise, they will have a sense of pride in working in such an enterprise [52]. At the same time, they also reflect on their own behavior and develop a sense of mission to protect the environment, thus forming a consistent perception with the enterprise.

Green organization identity, as an intangible resource, can effectively enhance an enterprise's green innovation performance. On the one hand, due to the pressure of eco-environmental protection, the enterprise will create a green organization identity within the enterprise, and through the green organization identity to influence the employees within the enterprise, so that the employees and the enterprise form a common cognition, and then can combine the employees' thoughts with the business philosophy of the enterprise [53]. On the other hand, green organization identity also influences the generation of employees' environmental awareness. Under the influence of green organization identity, employees will assess the current environmental protection situation of the enterprise and carry out innovation work in the actual work by combining green ideas, thus enhancing the green innovation performance of the enterprise [54].

Green innovation strategy can not only adjust the original production and operation mode to reduce the pollution to the environment, but also meet the need of environmental protection and draw the attention of employees within the enterprise to enhance the green organization identity. The green organization identity formed within the cooperate can help employees form a common perception with the enterprise, stimulate their environmental awareness, and thus improve the cooperate's green innovation performance. Hence, the subsequent hypothesis was developed:

Hypothesis 2 (H2). *Green organization identity mediates the relationship between a firm's green innovation strategy and green innovation performance.*

2.3. The Mediating Role of Employees' Green Innovation Behavior

Employee green innovation behavior refers to the behavioral choices exhibited by employees under the influence of the enterprise's green innovation strategy. This is usually manifested in the form of conscious green innovation activities by employees in their daily work, with green transformation of technologies and processes, etc., in order to reduce environmental pollution [55]. Green innovation behavior of employees is an active behavior of employees under the influence of corporate green innovation strategy. Thus, employees are more willing to protect the environment by participating in green innovation activities. Current research on green innovation behavior focuses on green innovation behavior at the organizational level, with little attention paid to the green innovation behavior of individual employees. However, as the ultimate executors of corporate strategies, employees' green innovation behaviors directly influence the green innovation behaviors of enterprises. Therefore, the mediating role of employees' green innovation behavior between corporate green innovation strategy and green innovation performance needs to be further investigated.

The green innovation strategy of an enterprise is ultimately implemented by the employees in the enterprise. Therefore, the formulation and implementation of an enterprise's green innovation strategy will influence the employees' green innovation awareness, which in turn affects their green innovation behavior choices. On the one hand, the green innovation strategy adopted by the corporate will change the existing production and operation processes of the enterprise and even penetrate the concept of "green innovation" into all aspects of the management of the enterprise, motivating employees to behave in line with the enterprise's green innovation values [56]. At the same time, employees will reflect on the ethical challenges involved in environmental sustainability and voluntarily make behavioral choices for green innovation behavior [57]. On the other hand, corporate green innovation strategies place higher demands on employees. Employees need to have more green knowledge and to innovate existing production techniques and technologies

to meet the needs of an enterprise's green innovation strategy. In turn, the development and implementation of an enterprise's green innovation strategy provides employees with opportunities to learn. This allows employees to be exposed to new knowledge and to improve their performance and capabilities through continuous experimentation and change [58]. Additionally, these changes made by employees will eventually manifest themselves through their green innovation behaviors.

The green innovation behaviors exhibited by employees are the basis for enterprises to improve their green innovation performance. First, employees will see their environmental protection as a responsibility, and the green innovation behavior of employees is a manifestation of their responsibility [55]. On this basis, employees will get rid of their original constraints and take a new perspective on environmental protection and corporate behavior, thus showing green innovation behavior at work and enhancing the green innovation performance of the enterprise. Secondly, the green innovation behavior of employees is proactive and not required by the enterprise. Therefore, employees show great enthusiasm and creativity in this process, and proactively put forward reasonable suggestions for the current problems of the enterprise and change them through their own innovative actions to improve the green innovation performance of the enterprise [59]. Finally, the green innovation behavior of employees will also have an impact on other employees, so as to drive other employees to focus on green innovation in the process of work and reduce environmental pollution. The mutual communication and exchange among employees improves the efficiency of knowledge exchange and learning in the enterprise, promotes green innovation within the enterprise, and provides opportunities to improve the performance of green innovation in the enterprise [60].

In the process of implementing the green innovation strategy, the enterprise has shaped the environmental awareness and concept of the employees, which makes the employees take the initiative to contact the green knowledge in the process of work, and innovate the existing production and research technology and process by continuously trying and learning, which helps to stimulate the green innovation behavior of the employees. The green innovation behavior demonstrated by employees at work can save a lot of energy and resources for the enterprise, while promoting the enterprise's technology and process innovation, effectively reducing the emission of pollutants and enhancing the green innovation performance of the enterprise. Compared with the previous green innovation behaviors focusing on the organizational level, employee green innovation behaviors take the direct executors of green innovation behaviors as the starting point, and the impact of green innovation behaviors on the green innovation performance of enterprises is studied from the individual level. The impact of enterprises' green innovation strategy on performance should not only be limited to economic and social performance, but green innovation performance is also the most direct manifestation of enterprise performance improvement. Employee green innovation behavior, as the most fundamental performance in an enterprise, can reflect the effect and trend of green innovation from a deeper level. Hence, the subsequent hypothesis was developed:

Hypothesis 3 (H3). *Employee green innovation behavior has a mediating role between corporate green innovation strategy and green innovation performance.*

2.4. Chain Intermediary Role

The success of organizational initiatives for environmental sustainability hinges upon employees' pro-environmental behaviors [61]. The implementation of green innovation strategies by enterprises can improve their green innovation performance. However, how to improve green innovation performance more effectively through green organization identity and employees' green innovation behavior needs further research. The green innovation strategy of an enterprise is essentially implemented by the internal employees, so the green innovation behavior of employees largely determines the effectiveness of green innovation performance. Green organization identity can strengthen employees' environ-

mental awareness and stimulate their green innovation behavior [62,63]. The stronger the identity of the green organization, the more members will also show green innovation behaviors, thus achieving green innovation in technology and process and reducing energy and resource waste. Liu (2019) [62] argues that the higher the identity of the green organization within the enterprise, the greater the impact on the employees. Employees are then able to devote a lot of time at work to researching technical and technological innovations, which promotes the level of innovation in the enterprise on the basis of protecting the environment. Chang et al. (2013) found that green organization identity can motivate employees' environmental commitment to enhance enterprises' green innovation performance [64]. Sharma (2000) [65] argues that by stimulating internal innovation awareness in enterprises, they can achieve green innovation in their production and operations as a part of their environmental strategies. According to existing research, corporate green innovation strategy draws employees' attention by adjusting the enterprise's production and operation methods and shapes green organization identity within the organization. Green organization identity can stimulate employees' environmental concepts and green innovation values. This makes employees focus on green innovation in technology and process in their daily work and show green innovation behaviors. The green innovation behavior of employees helps enterprises reduce energy and resource waste, achieve technology and process innovation, and thus enhance the green innovation performance of enterprises and reduce environmental pollution. In other words, with regard to green organization identity, employees' green innovation behavior may be the recursive mediator between the green innovation strategy and green innovation performance of the firm. Hence, the subsequent hypothesis was developed:

Hypothesis 4 (H4). *Green organization identity and employee green innovation behavior have a chain mediating role between corporate green innovation strategy and green innovation performance.*

In summary, the theoretical model of the relationship between corporate green innovation strategy, green organization identity, employee green innovation behavior and green innovation performance is shown in Figure 1.

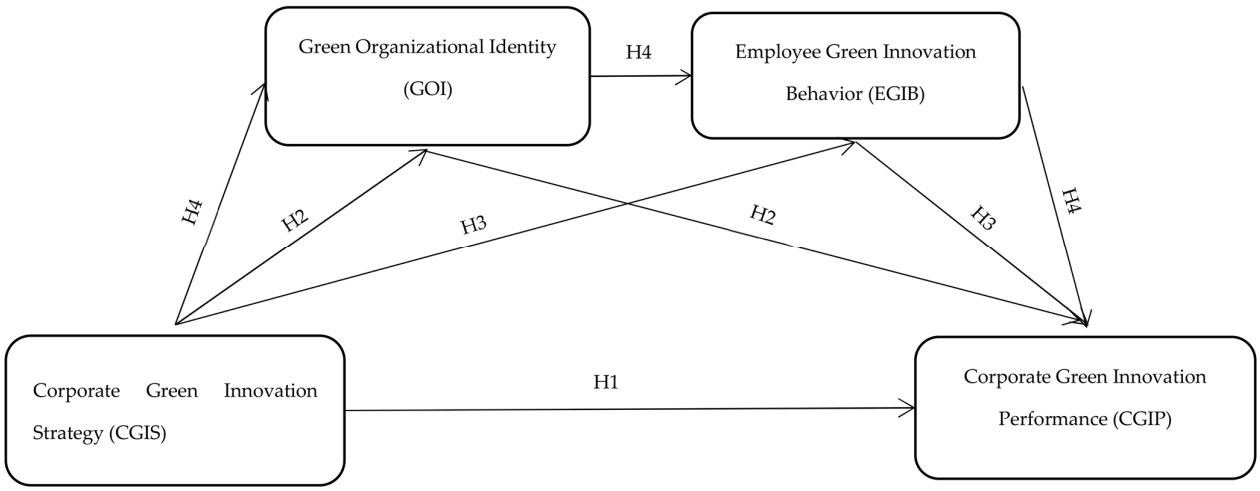


Figure 1. Theoretical model.

3. Methodology

3.1. Data Collection and Samples

As the main source of economic growth, the manufacturing industry is the main force that promotes the development of the economy, and at the same time, it is also the main cause of environmental damage. Therefore, there is an urgent need to enhance the green innovation performance of manufacturing enterprises by implementing green innovation strategies to reduce the pollution to the environment. Therefore, this paper

takes manufacturing enterprises as the research object to study the relationship between the green innovation strategy and green innovation performance of enterprises, so as to provide some reference for manufacturing enterprises to improve their green innovation performance. This study combined the existing mature scale with expert modification to form a preliminary questionnaire and further improved the measurement items through pre-research to form the final questionnaire. Among them, the basic information of the respondents' enterprises is a single-choice question, and other variables are measured by Likert 5-point scale, in which 1 to 5 indicate "very unconformity", "unconformity", "Fair", "Conform" and "Very Conform". Each variable contains 4–8 items, and the variables are measured in multiple ways.

In this study, our team visited eight universities, including Ocean University of China, Shandong University, Nanjing University, Shandong University of Finance and Economics, and China University of Petroleum, starting in October 2020, to get in touch with eligible MBA students from each university who are employed in manufacturing companies and to obtain a list of local manufacturing companies. The study finally identified 450 manufacturing companies as the population of the study. The study adopted a questionnaire to collect data and the respondents were mainly employees of the manufacturing companies. In order to increase the speed of questionnaire retrieval and to prevent emails from being automatically blocked, a member of our subject team called each respondent to explain the purpose of the study and the content of the questionnaire, once again stating that it was to be filled out anonymously in order to ensure the level of confidentiality of the questionnaire. In total, 450 questionnaires were distributed from October to December 2020, and 337 valid questionnaires were recovered by removing contradictory content responses and incomplete questionnaires, with a valid recovery rate of 74.9%. The basic situation of the sample is shown in Table 1. The Harman one-way test was used to test whether the data had homophily bias, and by analyzing the unrotated factors of all question items, the first principal component was found to account for 43.8% of the total variance, which was lower than 50%, indicating that the data did not have the problem of homophily bias.

The mechanism of the impact of corporate green innovation strategy on green innovation performance follows the theoretical logic of the process from "strategy" to "performance output" [66]. In other words, both the strategy-behavior and behavior-output phases of the process reflect causal relationships between variables, and the faces of these variables are explicit [67,68]. Therefore, this study adopts the research method of regression analysis to explore the process mechanism of the impact of enterprise green innovation on green innovation performance.

Table 1. Sample statistics.

Sample Classification		Quantity	Percentage	Sample Classification		Quantity	Percentage
Enterprise Nature	State Enterprise	78	23.15%	Enterprise Type	Communication Electronics Manufacturing	31	9.20%
	Private Enterprise	220	65.28%		Chemical Manufacturing	68	20.18%
	Three-funded Enterprise	39	11.57%		General Equipment Manufacturing	34	10.09%
Enterprise Size	Small Enterprise	87	25.82%		Electrical Machinery and Equipment Manufacturing	48	14.24%
	Medium Enterprise	185	54.90%		Transportation Equipment Manufacturing	24	7.12%
	Large Enterprise	65	19.29%		Metal and Non-metal Manufacturing	49	14.54%
Year of Enterprise Establishment	5 years and below	45	13.35%		Specialized Equipment Manufacturing	38	11.28%
	6–15 years	256	75.96%		Furniture Equipment Manufacturing	28	8.31%
	16 years and above	36	10.68%		Other Manufacturing	17	5.04%

3.2. Variable Measurements

3.2.1. Corporate Green Innovation Strategy

In this study, we draw on Chan's [69] measure of corporate green innovation strategies to realize green innovation in the whole process of corporate production and operation mainly from the perspectives of "energy saving" and "emission reduction", which includes seven questions, including "enterprises adjust their production operations to reduce environmental pollution", "enterprises adjust their production operations to proactively remediate the environment", and "enterprises adjust their production operations to reduce resource waste and pollution emissions".

3.2.2. Green Organization Identity

This study draws on Chen's [70] measure of green organization identity to focus on organizations' green innovation behaviors in environmental protection and the resulting sense of mission and pride from the perspective of organizational members, which includes six questions, including "Organizational members have a sense of mission to protect the environment", "Organizational members have a sense of pride in protecting the environment", "Organizational members believe that the enterprise plays a role in protecting the environment", and so on.

3.2.3. Employee Green Innovation Behavior

In this study, we draw on Zhang 's [71] measurement of employees' green innovation behaviors to proactively measure their energy-saving and emission reduction behaviors in daily production and operation from the employees' perspective, including four questions, such as "I use new processes at work to reduce energy consumption" and "I use new processes at work to reduce material consumption".

3.2.4. Green Innovation Performance

This paper draws on Chang and Chen [64] to measure green innovation performance, which is measured in two dimensions: green innovation performance in product development and green innovation performance in product production, with eight questions. Among them, the green innovation performance of product development includes four questions, such as "the enterprise chooses environmentally friendly materials in the product development process" and "the enterprise chooses raw materials that consume less energy in the product development process". The green innovation performance of product production includes four questions, including "enterprises recycle waste in the process of product production", "enterprises reduce the use of energy in the process of product production", and so on.

3.2.5. Control Variables

Referring to existing studies in the field of green innovation [53,72–74], we selected enterprise size and enterprise type as control variables to exclude the effects of enterprise size and enterprise type on green innovation performance.

4. Results and Analysis

4.1. Reliability and Validity Analysis

In this paper, the collected questionnaires were analyzed using SPSS 24.0. First, the exploratory factor analysis showed that the KMO values of all variables were greater than 0.7 and the significance of Bartlett's test was less than 0.001. We further tested the reliability and validity, and the results are shown in Table 2. It can be found that the Cronbach's α values of all variables are greater than 0.8 and the combined reliability CR is greater than 0.8. This indicates that the reliability of the collected data is good. All factor loadings were greater than 0.9 and the variable AVE values were greater than 0.6, indicating good convergent validity of the scale. Secondly, the square root of AVE on the diagonal is greater than the correlation coefficient of each variable (Table 3), which indicates

the good discriminant validity of the data. To further examine the discriminant validity among corporate green innovation strategy, green organization identity, employee green innovation behavior and green innovation performance, this paper conducted a validation factor analysis on the model. The results show that the overall fit of the four-factor model was the best (χ^2/df = 1.625; RMSEA = 0.051; CFI = 0.907; GFI = 0.912; AGFI = 0.878).

Table 2. Scale reliability and validity test results.

Variables	Measurement Question Items	Factor Loading	α
Corporate Green Innovation Strategy CR = 0.908 AVE = 0.616	Enterprises adjust their production operations to reduce environmental pollution	0.880	0.919
	Enterprises adjust their production operations to take the initiative to restore the environment	0.887	
	Enterprises adjust their production operations to reduce resource waste and pollution emissions	0.805	
	Enterprises adjust their production operations to recycle waste	0.856	
	Enterprises use less polluting energy sources	0.825	
	Enterprises adjust their production operations to reduce energy consumption	0.848	
	Enterprises adjust their production operations to reduce the pollution of their products to the environment	0.836	
Green Organization Identity CR = 0.955 AVE = 0.718	Members of the organization have a sense of mission to protect the environment	0.908	0.925
	Members of the organization have a sense of pride in environmental protection	0.907	
	Members of the organization believe that enterprises play a role in protecting the environment	0.909	
	Members of the organization believe that the enterprise has taken measures to protect the environment	0.823	
	Members of the organization understand the corporate culture of environmental protection	0.877	
	Members of the organization recognize the enterprise's measures to protect the environment	0.878	
Employee Green Innovation Behavior CR = 0.961 AVE = 0.806	I have ideas to reduce emissions and waste of resources in my job	0.952	0.850
	I use new methods to handle waste in my job	0.934	
	I use new processes to reduce energy consumption in my job	0.916	
	I use new processes to reduce material consumption in my job	0.908	
Green Innovation Performance CR = 0.956 AVE = 0.732	Enterprises will choose environmentally friendly materials in the product development process	0.886	0.875
	Enterprises choose raw materials that consume less energy in the product development process	0.882	
	Enterprises reduce the use of raw materials in the product development process	0.810	
	Enterprises focus on product recycling in the product development process	0.828	
	Enterprises reduce the discharge of waste during the production of products	0.883	
	Enterprises recycle waste in the production process	0.813	
	Enterprises reduce energy use in the production of their products	0.894	
	Enterprises reduce the use of raw materials in the production process of their products	0.844	

Table 3. Mean, standard deviation and correlation coefficient of each variable.

Variables	Mean	Standard Deviations	1	2	3	4	5	6
1.Enterprise Size	2.000	0.634	1					
2.Enterprise Type	4.570	2.096	0.031	1				
3.Corporate Green Innovation Strategy	4.319	0.485	−0.021	0.085	**0.784**			
4.Green Organization Identity	4.252	0.495	−0.089	0.061	0.600 **	**0.847**		
5.Employee Green Innovation Behavior	4.338	0.469	0.027	0.065	0.651 **	0.506 **	**0.897**	
6.Green Innovation Performance	4.348	0.416	0.135	0.116	0.533 **	0.566 **	0.514 **	**0.855**

Note: ** denotes $p < 0.01$; diagonal bold values are square root of AVE.

4.2. Descriptive Statistics and Correlation Analysis

The means, standard deviations and correlation coefficients of the variables are shown in Table 3. It can be found that corporate green innovation strategy is significantly and positively correlated with green organization identity (r = 0.600, $p < 0.01$), employee green innovation behavior (r = 0.651, $p < 0.01$) and green innovation performance (r = 0.533, $p < 0.01$). Green organization identity was significantly and positively related to employees' green innovation behavior (r = 0.506, $p < 0.01$) and green innovation performance (r = 0.566, $p < 0.01$). In addition, employee green innovation behavior and green innovation performance (r = 0.514, $p < 0.01$) were significantly and positively correlated. The results of the cointegration test showed that the VIF values in each regression model were less than 2 and the tolerance was greater than 0.6, which indicated that there was no multicollinearity problem.

4.3. Regression Analysis

In this paper, the hypotheses are tested using cascade regression analysis, controlling for firm size and firm type, and the test results are shown in Tables 4 and 5.

Table 4. Results of regression analysis of corporate green innovation strategy, green organization identity and green innovation performance.

Variable	Green Organization Identity		Green Innovation Performance			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Enterprise Size	−0.091	−0.077	−0.139	−0.126	−0.088	−0.098
Enterprise Type	0.064	0.012	0.120	0.075	0.085	0.071
Corporate Green Innovation Strategy		0.597 ***		0.524 ***		0.302 ***
Green Organization Identity					0.553 ***	0.372 ***
F	1.389	43.856 ***	3.863	33.390 ***	38.326 ***	36.774 ***
R^2	0.012	0.366	0.033	0.305	0.335	0.393
ΔF		127.258 ***		89.461 ***	103.784 ***	67.443 ***
ΔR^2		0.354		0.273	0.303	0.361

Note: *** indicates $p < 0.001$.

Table 5. Results of regression analysis of corporate green innovation strategy, employees' green innovation behavior and green innovation performance.

Variable	Employee Green Innovation Behavior		Green Innovation Performance			
	Model 7	Model 8	Model 3	Model 4	Model 9	Model 10
Enterprise Size	−0.029	−0.014	−0.139	−0.126	−0.124	−0.122
Enterprise Type	0.066	0.01	0.120	0.075	0.087	0.072
Corporate Green Innovation Strategy		0.650 ***		0.524 ***		0.339 ***

Table 5. *Cont.*

Variable	Employee Green Innovation Behavior		Green Innovation Performance			
	Model 7	**Model 8**	**Model 3**	**Model 4**	**Model 9**	**Model 10**
Employee Green Innovation Behavior					0.505 ***	0.285 ***
F	0.579	56.082 ***	3.863	33.390 ***	30.481 ***	30.836 ***
R^2	0.005	0.425	0.033	0.305	0.286	0.352
ΔF		166.253 ***		89.461 ***	81.018 ***	16.405 ***
ΔR^2		0.42		0.273	0.254	0.047

Note: *** indicates $p < 0.001$.

4.3.1. Main Effects Test

To test the effect of corporate green innovation strategy on green innovation performance, regression analysis was conducted with green innovation performance as the dependent variable and corporate green innovation strategy as the independent variable. From model 4, it is shown that corporate green innovation strategy (β = 0.524, $p < 0.001$) has a significant positive effect on green innovation performance. Hypothesis 1 was verified.

4.3.2. Testing the Mediating Role of Green Organization Identity

This study used cascade regression analysis to examine the mediating role of green organization identity, and the results are shown in Table 4. Model 2 investigates the effect of corporate green innovation strategy on green organization identity, and model 5 investigates the effect of green organization identity on green innovation performance. From model 2 and model 5, it can be seen that corporate green innovation strategy (β = 0.597, $p < 0.001$) has a significant positive effect on green organization identity, and green organization identity (β = 0.553, $p < 0.001$) has a significant positive effect on green innovation performance. To verify the mediating role of green organization identity between corporate green innovation strategy and green innovation performance, green innovation performance was used as the dependent variable, while control variables, corporate green innovation strategy and green organization identity were added to the model in turn. As shown in model 6, both corporate green innovation strategy (β = 0.302, $p < 0.001$) and green organization identity (β = 0.372, $p < 0.001$) have a significant positive effect on green innovation performance, but the regression coefficient β of corporate green innovation strategy on green innovation performance decreases from 0.524 (model 4) to 0.302 (model 6). Therefore, green organization identity plays a partially mediating role between corporate green innovation strategy and green innovation performance. Hypothesis 2 was tested.

4.3.3. Testing the Mediating Role of Employees' Green Innovation Behavior

This study used hierarchical regression analysis to test the mediating role of employees' green innovation behavior, and the results are shown in Table 5. Model 8 investigates the effect of corporate green innovation strategy on employees' green innovation behavior, and model 9 investigates the effect of employees' green innovation behavior on green innovation performance. From model 8 and model 9, it can be seen that corporate green innovation strategy (β = 0.650, $p < 0.001$) has a significant positive effect on employee green innovation behavior, and employee green innovation behavior (β = 0.505, $p < 0.001$) has a significant positive effect on green innovation performance. To verify the mediating role of employee green innovation behavior between corporate green innovation strategy and green innovation performance, green innovation performance was used as the dependent variable, while control variables, corporate green innovation strategy and employee green innovation behavior were added to the model in turn. As shown in model 10, both corporate green innovation strategy (β = 0.339, $p < 0.001$) and employee green innovation behavior (β = 0.285, $p < 0.001$) have a significant positive effect on green innovation performance, but the regression coefficient β of corporate green innovation strategy on green innovation

performance decreases from 0.524 (model 4) to 0.339 (model 10). Therefore, employee green innovation behavior plays a partially mediating role between corporate green innovation strategy and green innovation performance. Hypothesis 3 was tested.

4.3.4. Testing the Chain Intermediary Role

To test the chain mediating effects, this study used the Bootstrap method with a random sample of 5000 using 95% confidence intervals, and the results are shown in Table 6. The effect value of the effect of corporate green innovation strategy on green innovation performance was 0.341 with a 95% confidence interval [0.222, 0.455], which does not contain 0. The indirect effect was significant. The effect value of green organization identity as a mediating variable is 0.199 with a 95% confidence interval [0.116, 0.290] and does not contain 0. The effect value of employee green innovation behavior as a mediating variable is 0.119 with a 95% confidence interval [0.039, 0.205] and does not contain 0. The effect value of green organization identity, employee green innovation behavior as a chain mediating variable effect value w0.024, 95% confidence interval [0.004, 0.052], does not contain 0. Therefore, green organization identity and employee green innovation behavior have a chain mediating role between corporate green innovation strategy and green innovation performance. Therefore, Hypothesis 4 is valid.

Table 6. Robustness tests of the mediating effect of organizational green learning.

Paths	Effect Value	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
X→Y	0.341	0.060	0.222	0.455
X→M_1→Y	0.199	0.045	0.116	0.290
X→M_2→Y	0.119	0.042	0.039	0.205
X→M_1→M_2→Y	0.024	0.012	0.004	0.052

Note: X is corporate green innovation strategy; Y is green innovation performance; M1 is green organization identity; M2 is employee green innovation behavior.

5. Conclusions and Implications

5.1. Conclusions and Discussion

Based on the natural resource-based view, this study considers green innovation as an important strategic resource and examines the relationship between corporate green innovation strategy and green innovation performance. The results of the study are as follows: (1) Corporate green innovation strategy has a significant positive impact on green innovation performance. (2) Green organization identity has a mediating role between corporate green innovation strategy and green innovation performance. (3) Employees' green innovation behavior has a mediating role between green innovation strategy and green innovation performance. (4) Green organization identity and employee green innovation behavior have a chain mediating role between corporate green innovation strategy and green innovation performance.

Corporate green innovation, as an important strategic decision, is a product of top-level design, reflecting the decision-making will of managers [75,76]. How to transform managers' green innovation will into green innovation management performance has become the focus of scholars' discussion. To achieve this goals, scholars have explored the realization path of green innovation strategies based on the organizational management perspective, from the perspective of external drivers such as government [77,78], suppliers [79], and media attention [80,81]. Although corporate green innovation brings good environmental benefits [82,83] or corporate financial benefits [84,85] under the influence of external drivers, few studies have demonstrated the "win-win" benefits of green innovation strategies in terms of ecological and economic benefits. The important reason for this is that existing studies have neglected the important driving role of green innovation behaviors in green HRM in firms and the ability of firms to integrate resources internally [86]. Employees' green innovation behavior, an important strategic resource of the enterprise, is a key

link in the implementation of the green innovation strategy [87]. Through organizational learning, employees improve their green absorptive capacity and achieve knowledge creation and skill enhancement [88,89], which ultimately translates into their green innovation outputs (green innovation behaviors). Of course, an important prerequisite for proactive learning behaviors among employees is that they develop organizational buy-in to the company's green innovation strategy [90]. This study reveals the bridging role played by green organizational identity and employees' green innovation behavior through "corporate green innovation strategy—green organizational identity—employees' green innovation behavior—corporate green innovation performance". They not only connect strategy and performance outputs, but also enable organizations to connect with individuals. At the same time, this echoes Ren et al.'s (2018) [56] initiative to further explore the mechanisms of the role of green human resources on green innovation behaviors at the individual level and organizational level.

5.2. Theoretical Implications

First, this paper verifies the relationship between corporate green innovation strategy and green innovation performance by using manufacturing enterprises as the research object. The study shows that corporate green innovation strategy has a significant positive impact on green innovation performance, which helps to alleviate the controversy between environmental benefits and economic benefits. The existing studies have two opposing views on the relationship between green innovation strategies and green innovation performance. Proponents believe that the implementation of green innovation strategy can promote green innovation activities and green innovation of the enterprise's technology and process, which in turn can enhance green innovation performance. The opponents believe that the implementation of green innovation strategy requires changing the existing production and operation methods and making green investments, which increases the operating costs of enterprises and thus affects the green innovation performance of enterprises. However, in the face of the current serious environmental problems, it is necessary for enterprises to implement green innovation strategies to improve their green innovation performance. This paper demonstrates the promotion effect of corporate green innovation strategy on green innovation performance from the internal resources and capabilities of enterprises and enriches the research on the influence between corporate green innovation strategy and green innovation performance.

Second, this paper introduces green organization identity into the study of the impact of corporate green innovation strategy on green innovation performance. The study shows that green organization identity plays a mediating role between corporate green innovation strategy and green innovation performance. Green organization identity can integrate employees' perceptions with corporate strategies, which in turn influences employees' awareness and behaviors to enhance corporate green innovation performance. This extends the research on the relationship between green innovation strategy and green innovation performance and unveils the "black box" of the process of green innovation strategy implementation and green innovation performance improvement.

Finally, this paper introduces employees' green innovation behavior from the individual level and verifies the role of employees' green innovation behavior among corporate green innovation strategy, green organization identity and green innovation performance. This breaks the situation that most of the previous studies on green innovation focus on the organizational level and ignore the individual level. As the executors of green innovation strategies, employees' individual behaviors directly affect the implementation of the strategies and thus have an impact on green innovation performance. By introducing employees' green innovation behaviors into the study, we realize the research idea of moving from organization to individual and then to organization, focusing on the individual level and explaining the green innovation process of enterprises more clearly. It also enriches the influence mechanism between green organization identity and green

innovation performance and discovers a new path from green organization identity to green innovation performance.

5.3. Practical Implications

On the one hand, enterprises should pay attention to the direct purpose of implementing green innovation strategies. Improving the financial performance and social performance of enterprises is the purpose of implementing green innovation strategy, but it is not the only purpose. Enterprises themselves should be clear that the direct purpose of implementing green innovation strategy is to improve their green innovation performance, which is the basis for improving other performance. Enterprises should also pay attention to the cost and time concept in the process of implementation, and they should not give up the implementation of green innovation strategy just because the expected effect is not achieved in a short period of time, but should consider the problem from a long-term perspective, so as to ensure the durability of green innovation strategy enhancement.

On the other hand, enterprises should pay attention to internal resources and capabilities such as green organization identity and employees' green innovation behavior. The green innovation strategy of enterprises needs internal employees to implement it; therefore, employees' attitude and concept of environmental protection largely determine the effect of green innovation performance improvement. Enterprises should pay attention to the process of shaping green organization identity, actively guide employees' concepts and awareness in the daily operation process, pay attention to employees' green innovation behaviors, take measures to encourage employees to carry out green innovation activities, effectively improve the level of green innovation, and then enhance the green innovation performance of enterprises.

6. Limitations and Future Research

This paper investigates the impact of corporate green innovation strategies on green innovation performance, but there are still some shortcomings. First, this paper investigates the impact of green innovation strategies on green innovation performance in the context of China, but further research is needed to determine whether the impact is consistent in other countries and regions. Second, this paper uses a questionnaire survey to collect data, which is affected by the survey time and other conditions, and analyzes cross-sectional data. Finally, this paper focuses on the internal green organization identity and employees' green innovation behavior, and it does not consider the influence of external factors on the implementation of green innovation strategy and the improvement of green innovation performance, which can be combined with the influence of external factors for comprehensive investigation in the future.

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