RESEARCH ON THE INTERNAL MOTIVATION OF GREEN INNOVATION IN ENTERPRISES

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This paper mainly establishes the internal driving model of enterprises' green innovation behavior, deeply studies the internal factors that affect enterprises' green innovation, and analyzes its influencing mechanisms. Based on the theories of planned behavior, reputation theory, and political promotion championship theory, this paper deeply explores the internal driving factors and influencing relationships of corporate green innovation behavior from the perspective of micro-research within enterprises and further examines the characteristics of enterprises such as enterprise size, enterprise nature, and industry attributes. This paper explores whether there is a moderating effect on the internal driving force of green innovation behavior.

The results show that: (1) the motivation of enterprises to avoid environmental penalties, the motivation to obtain environmental protection honors, and the motivation for political promotion of senior executives of state-owned enterprises all have a promoting effect on the green innovation behavior of enterprises; (2) In state-owned enterprises, the motivation for avoiding environmental penalties, the motivation for obtaining environmental protection honors, and the motivation for executive promotion have a better positive impact on green innovation than that of non-state-owned enterprises. The conclusions of this study broaden the research perspective of the related fields of green innovation behavior, enrich the theoretical research scope of the influencing factors of corporate green innovation behavior, and enrich the relevant research on the influence of enterprise characteristics on corporate behavior. It will help to improve the scientific formulation of supervision and incentive mechanisms by government managers, provide methods for enterprises to improve the efficiency of environmental governance, and also help the public to recognize and
understand the internal influencing factors of corporate green innovation, providing a new perspective for social supervision.

**Keywords:** green innovation; environmental punishments; environmental honors; political promotion

**Introduction**

The global environmental protection situation is urgent, and environmental issues have increasingly become the focus of the international community. In 1992, the United Nations Environment Program released the State of the World Environment Report 1972–1992, with a large amount of data showing that the global environment is deteriorating and mankind is facing unprecedented environmental challenges.

At the same time, the international economic situation is also undergoing profound changes, and the global demand for the common development of social and economic performance is irreversible. In the past 30 years, China has achieved an amazing growth rate, reforms, and opening up of the market economy policy in a certain period to promote the development of enterprises, but behind the rapid growth of economic indicators also came a huge environmental cost. The arbitrary development of natural resources, unrestrained use, and serious damage to the ecological environment brought a great threat to people's lives.

Since 2010, China has participated in the annual Global Environmental Performance Index five times, ranking behind the 100th place for five consecutive years. China is already the world's largest carbon emitter economy, with annual carbon emissions of about 100 billion tons, almost twice that of the United States and nearly 30% of the global carbon emissions, reflecting the seriousness of China's environmental pollution and the urgency of solving environmental problems. It is urgent to improve China's environmental situation, which is urgent and imminent.

**Objectives**

Most of the existing research at home and abroad is concentrated on the enterprise green innovation behavior of external influence factors, and the theory of these studies mainly focuses on system theory, resource base theory, and game theory. The focus of the fundamental purpose is to maximize economic interests and ignore the enterprise non-economic benefit maximization motivation influence factors. Research on the green innovation behavior of enterprises is limited to the analysis of social phenomena and environmental problems.

Without a deep look into the nature of enterprises' green innovation behavior, this paper, mainly by establishing the internal driving force model of enterprise green innovation behavior, the analysis of the internal factors affecting green innovation, based on planning behavior theory, reputation theory, promotion championship theory, to study the relationship between the driving factors of enterprise green innovation behavior and the influence of green innovation behavior from three directions: avoiding environmental punishment, obtaining environmental protection honor, and the political promotion of senior executives of state-owned enterprises, and test whether the nature of enterprises, enterprise scale, industry attributes, and other factors affect the internal drive of enterprise green innovation behavior and the role of green innovation behavior.
In order to grasp the internal motivation for influencing enterprises to actively carry out green innovation, put forward reasonable guidance and policy suggestions for the government to formulate the mechanism, provide a reference basis for the green innovation of enterprises, improve corporate economic and environmental performance.

**Literature review**

The term "innovation" was first put forward by Joseph Schumpeter in the Theory of Economic Development in 1912, which mainly includes innovation in products, technologies, markets, raw materials, and organizations. Traditional technological innovation mainly enhances the competitiveness of enterprises in order to obtain higher economic benefits, and exploring what role technological innovation plays in the process of economic development has always been a hot topic in the field of corporate governance. In recent years, with the intensification of environmental problems and the enhancement of public environmental awareness, green innovation has emerged at a historic moment.

The concept of green innovation was first put forward in Europe and America in the 1960s. European and American countries promulgated laws and regulations related to environmental protection, proposing to carry out terminal pollution control and promote harmless and low-harm green technologies.

At present, scholars have not yet given a unified definition of the concept of green innovation. Linde (1995) pointed out that green innovation includes many aspects, including green innovation in products, processes, management, and other aspects. Through green innovation, it can effectively reduce environmental pollution, improve production efficiency, and improve the competitiveness of enterprises.

Zhang & Zhang (2011) summarized the definition of green innovation into three categories: the first is that green innovation aims to mitigate the adverse environmental impact caused by organizations.

As noted in Ghisetti & Rennings (2014), all behaviors that can reduce environmental pollution and reduce environmental burden can be classified as green innovation.

The second view is that green innovation is equivalent to improving environmental performance. As in Driessen et al. (2013) green innovation should produce significant environmental benefits. The third type regards green innovation as environmental innovation or the improvement of environmental performance. That is to say, all technological innovation that is conducive to ecological development and ecological civilization construction and has a positive impact on the environment can be regarded as green innovation.

Specifically, green innovation is a kind of innovation activity aimed at reducing the environmental impact of enterprises. It emphasizes the reduction of environmental pollution and resource conservation through a series of production processes and management methods, so as to achieve specific environmental protection purposes and sustainable development. Through green innovation, enterprises can not only improve their economic performance but also achieve their social responsibility to maintain and improve environmental performance through green technology.

With the increasingly serious environmental pollution problem and the public's increasing attention to the environmental performance of enterprises, China's supervision, management, and punishment of listed companies' environmental governance are increasing.
At present, the environmental punishment of listed companies in China is mainly manifested by the continuous increase of the number of polluters and the enhancement of environmental punishment year by year, and fines are the main means of environmental punishment (Chen, 2023).

However, in the face of the expectation of the government's stricter environmental regulation, enterprises will be able to carry out environmental governance as soon as possible, that is, to carry out endogenous environmental governance. In this way, enterprises can adopt environmental governance measures more suitable for their enterprises through research and development so as to reduce the cost of regulation compliance (Wang, 2007).

In this paper, the motivation of the above enterprises to actively engage in environmental governance in order to reduce regulation costs is defined as the motivation to avoid environmental punishment.

At present, there are studies on the influencing factors of enterprise green innovation, which can be roughly divided into three aspects:

(1) Research on the perspective of stakeholders

The market pressure generated by external stakeholders such as suppliers, competitors, and consumers is an important factor affecting enterprises' ability to carry out green innovation.

Cao & Chen (2017) used the questionnaire design to construct market pressure through the three dimensions of customers, suppliers, and competitors. Found that market pressure has a significant boost to green innovation. Specifically, the selection tendency of environment-friendly products by consumers affects the green strategy of enterprises. The importance that suppliers attach to green environmental protection influences the strategic selection of upstream and downstream enterprises through the supply chain system. Competitors influence the green innovation strategy of enterprises through the environmental protection pressure generated by market competition; similarly, Kawai et al. (2018) pointed out that market stakeholders such as suppliers, customers, and consumers will encourage enterprises to carry out green innovation through purchasing behavior.

Sarkar (2013) found that the purpose of green innovation is to obtain more market opportunities.

Hojnik & Ruzzier (2016) also found that green innovation can help enterprises win market advantages and competitive resources. When faced with harsh market competition, enterprises will maintain their market position and resource advantages to follow their competitors and carry out green strategies.

(2) There are studies on the influencing factors of environmental regulation.

Institutional theory believes that the driving force of enterprise green innovation comes from institutional pressure, including the pressure of government environmental regulation. There are three main opinions on how environmental regulation affects the green innovation of enterprises: first, environmental regulation offsets the cost of system compliance, produces innovation compensation, and promotes enterprises to develop green innovation (Yu et al., 2016; Liu & Xiao, 2022).

Second, environmental regulation is essentially an additional cost imposed by the government on enterprises, which hinders their willingness and ability to make green innovations.
Leeuwen & Mohnen (2017) empirically show that environmental regulation will reduce the production efficiency level of green innovation in the manufacturing industry. Third, the long-term impact of environmental regulation on green innovation is nonlinear; that is, there is a threshold effect between environmental regulation and green innovation (Shen, 2012; Zhang & Zhang, 2016).

When the government regulates environmental pollution, the punishment is relatively weak, and the enterprise management has insufficient motivation to avoid green innovation; strict environmental regulation favors enterprises in green and green industries and increases green innovation expenditure (Qi et al., 2018; Wang & Wang, 2021). Although the literature is abundant, there has been no consensus on the driving force of environmental regulation.

Some studies have discussed the impact of different environmental regulations on green innovation. Among them, some studies have found that imperative environmental regulation has an impact on green innovation mainly through energy regulation and environmental law enforcement (Li & Xiao, 2020; Zhou et al., 2021); market-based environmental regulation mainly has an impact on green innovation through environmental protection taxes, carbon emission rights trading, and environmental rights and interests trading (Qi et al., 2018).

Some scholars also believe that different types of environmental regulations have heterogeneous effects on green innovation. For example, Wang & Wang (2021) found that the implementation of imperative environmental regulation, voluntary environmental regulation, and ISO 14001 certification has significantly enhanced the induction of green innovation in enterprises.

Li et al. (2018) found that, based on 115 enterprises in Fujian Province, both command environmental regulation and incentive environmental regulation can promote the improvement of the green innovation ability of enterprises.

On the contrary, Kesidou (2011) research shows that strong environmental regulations increase the cost of enterprises and hinder the development of green innovation activities.

According to Kneller & Manderson (2012) we concluded that environmental regulation increases the environmental protection expenditure of enterprises, occupies the R&D resources of enterprises, and thus reduces the motivation for enterprises to carry out green innovation.

And Li & Xiao (2021), in their study of China's heavy pollution enterprises, found that different types of environmental regulation tools influenced the influence of green innovation, including environmental protection subsidies due to enterprise opportunism and the government's ability to cater to the behavior of the enterprise green innovation, sewage charges through external pressure, and internal incentives reversed transmission enterprises to carry out the green innovation.

Similarly, Liang et al. (2021) classified environmental regulation into imperative environmental regulation and market incentive environmental regulation and found that different types of environmental regulation have different effects. Imperative environmental regulation can promote green process innovation but have no impact on green product innovation; market incentive environmental regulation can significantly promote both green process innovation and green product innovation.

With the deepening of research, some scholars have found that the relationship between environmental regulation and green innovation is not enough to use a simple linear relationship.
Research on the perspective of internal factors in enterprises

From the perspective of enterprises, the existing literature mainly explores two aspects: enterprise resources and capabilities and the characteristics of senior executives.

In terms of the influence of the resources and capabilities of enterprises, the research has found that the political resources, financing resources, redundant resources, supply chain coordination ability, and green management ability of enterprises will all affect the green innovation level of enterprises (Wang, 2008).

Liang et al. (2022) empirically studied the impact of executives' environmental cognition and dynamic ability on green innovation performance. Taking manufacturing enterprises as research samples, the research results show that executives' cognition of environmental protection is positively related to the green innovation performance of enterprises.

The higher the environmental awareness level of senior executives, the more willing they are to invest in all aspects of the resources of enterprises in green innovation, which can bear the high risk brought by green innovation, so as to promote the performance improvement of green innovation. In addition to the environmental awareness of senior executives, Wang & Wang (2021) found through empirical research that executive compensation stickiness can also play a similar role in enterprise innovation input and output and further improve the performance level of green innovation in enterprises.

Methodology

As can be seen from the above research problems, research objectives, and contents, this research mainly focuses on the research order of different drivers of the green innovation behavior of enterprises from the perspective of maximizing non-economic benefits. According to the research, this paper adopts the research method of combining theory and empirical evidence.

Specific research methods for this paper are: literature and research methods, logical analysis method, and empirical research method.

Results

It is very important to study the internal motivation of enterprise green innovation and its influence mechanisms for building an eco-friendly society and realizing sustainable development. Based on the data of A-share listed companies from 2015 to 2020, this paper studies the influence of enterprise internal motivation on green innovation and, on this basis, explores the relationship between enterprise scale, enterprise nature, industry, and other factors on the internal motivation of enterprises and green innovation.

The research clarifies the importance of green innovation in the current context of environmental protection and sustainable development and points out the challenges and opportunities faced by enterprises in the process of green innovation. Our analysis focuses on three main internal drivers: motivation to avoid environmental penalties (penalty), motivation to obtain environmental honor (reputation), political motivation for the promotion of state-owned enterprises (promotion), and several control and adjustment variables. Based on the data analysis results, the following conclusions are drawn:
Motivation to avoid environmental punishment (penalty): data show that in the face of government regulation pressure, the more enterprises tend to avoid potential environmental penalties through green innovation, the more active their green innovation activities are. This finding highlights the importance of policymakers’ strict regulations on environmental protection and also shows how companies adjust their strategies under external pressure.

Motivation to obtain environmental honor (reputation): research has found that the pursuit of environmental honor is a strong incentive for enterprises to carry out green innovation. Enterprises not only value their economic benefits but also pay more and more attention to establishing a good image of environmental responsibility among the public and stakeholders.

Political Promotion Motivation of Senior Executives of State-Owned Enterprises (Promotion): in state-owned enterprises, the political promotion motivation of senior executives is an important factor in promoting green innovation. Due to the limitation of salary incentives, political promotion has become one of the main drivers of soE executives, which directly affects their decisions and investments in green innovation.

In addition, control variables such as environmental regulation (Regulation), enterprise age (Age), growth (Growth), cash flow from business activities (Cash), and adjustment variables such as nature of enterprise (Soe), enterprise size (Size), and industry (Industry) also played an important role in the analysis. The positive effect of motivation on green innovation is better than that of non-state enterprises. The motivation of environmental punishment and the promotion of green innovation is stronger than that of non-heavy pollution enterprises.

Discussion

Enterprise green innovation ability is an important engine of high-quality development. To ensure enterprise efficiency and the coordinated development of environmental protection, enterprises need to set up the green innovation consciousness, the green innovation team construction, actively green innovation research and development work, and strengthen environmental protection marketing to improve the efficiency of innovation achievements.

(1) Formulate a green development strategy. Enterprises should integrate the concept of green innovation into their whole development process. Enterprises can integrate the green development strategy into the enterprise strategy, decompose the strategy to formulate specific business plans, and produce and operate the enterprise with the goal of green innovation and development. In the production process, enterprises need to carry out product life cycle evaluation to realize the green life cycle of products from design, raw material procurement, production, and sales, and conduct continuous environmental monitoring and control in this process.

In the post-evaluation, environmental performance and green innovation achievement indicators are included in the performance evaluation mechanism, and rewards and punishments are implemented for environmental management achievements.

At the same time, the enterprise can strengthen cooperation with other parties, such as green supply chain management, priority cooperation with environmental protection qualification suppliers, strict supplier access and annual audit, letting customers also join the design production process, according to the needs of customers to cooperate with suppliers,
realizing the whole supply chain greening, and at the same time, establishing a harmonious environmental protection supply chain.

(2) Reserve green R&D funds and talents. Enterprises should actively carry out special reserves of green innovation funds and improve the construction of green R&D talent teams. On the one hand, the enterprise in the case of sufficient liquidity, can appropriately increase investment in scientific research, and gradually improve the attention of green innovation research and development activities, the money into energy conservation and emissions reduction technology, circular production technology research and development, in addition, the enterprise can also actively for the introduction of high quality green patent at home and abroad, through learning the advanced environmental protection technology, enhance the level of green innovation, gradually improve the green patent in the patent proportion, improve the quality of green innovation, strengthen the green patent invention patent proportion, high quality innovation.

On the other hand, enterprises need to actively introduce green and innovative talents, actively absorb high-quality innovative talents, improve employee salary and welfare, design more perfect employee training plans, attract excellent talents, and at the same time strengthen environmental technology training for employees and cultivate excellent talents. Enterprises can also cooperate with the scientific research structure, take advantage of their excellent talent reserve, complement the advantages of talents and resources, reduce the risk of environmental protection research and development, improve the output of green technology, and drive the high-quality development of enterprises.

(3) Strengthen the publicity and marketing of green products. Enterprises should strengthen the publicity and marketing of green innovative products, guide and stimulate the demand for green products in the consumer market, accelerate the transformation of green innovation achievements, and help enterprises maintain sustainable and high-quality development.

Enterprises can actively submit the product verification application to the third-party authority, review the environmental protection quality standards, print and distribute the green environmental protection marks on the products after the inspection passes, and focus on the marketing of green innovation as a feature in the process of product publicity. At the same time, enterprises can use green innovative products to actively participate in product exhibitions or technical exchange activities held at home and abroad, expand the popularity of products, gradually improve their own products in the technical exchange, and actively obtain the recognition of society and other enterprises in the industry.

Enterprises can also, through regular "green" activities, invite customers or community residents into the enterprise Open Day to show them the main green products production process and production Green Park, its environmental protection construction experience and achievements to social inspection, enhance product awareness, power green product sales, and speed up innovation achievements.

(4) Create a green and innovative enterprise culture. Enterprises need to create a green, innovative, environmental-protective corporate culture to shape a good corporate image. Employees are an important support for the enterprise to maintain long-term operation. The status of employees is bound to affect the operation of the enterprise, and the mental outlook of employees is also a display of the corporate image.

So enterprises need to actively improve staff's environmental protection consciousness and innovation consciousness, time to carry out the interpretation of environmental
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protection policies and regulations and training work, strengthen staff environmental protection consciousness, establish and improve the enterprise innovation incentive system, reward for research and development, stimulate staff innovation enthusiasm, and actively carry out the protection of intellectual property rights training, strengthen staff awareness of intellectual property rights, to assist scientific research personnel to protect the scientific research achievements, create a good atmosphere of scientific research.

In addition, while actively carrying out green innovation, enterprises should actively undertake social responsibilities, fully disclose information about green innovation and environmental performance, so that the public can immediately understand the environmental governance work of enterprises, and build a good corporate image.

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*Paper submitted* 11 December 2023
*Paper accepted for publishing* 23 January 2024
*Paper revised* 14 February 2024
*Paper published online* 30 March 2024