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Driving mechanism of low-carbon innovation: based on the perspective of green entrepreneurship orientation and innovation flexibility

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Abstract: Enterprises can obtain the benefits brought by environmental protection.This study constructs a theoretical model and uses SPSS. 26 to analyze the data,The results show that green entrepreneurial orientation has a positive impact on low-carbon innovation; Innovation flexibility positively moderates the relationship between green entrepreneurial orientation and low-carbon innovation;Innovation flexibility plays a positive moderating role in the mediating effect of green resource bricolage.

Keywords: low-carbon innovation;innovation flexibility; green entrepreneurship orientation.

1. Introduction

Enterprises can obtain the benefits brought by environmental protection [1]. The biggest difference between low-carbon innovation and traditional innovation lies in its dual externalities, that is, the spillover effect in the R & D innovation stage and the environmental spillover effect in the adoption and diffusion stage [2]. Compared with traditional innovation, The process of low-carbon innovation is often more complex and demanding. Academic research on low-carbon innovation is still in the exploratory stage. At present, scholars' research on low-carbon innovation mainly focuses on R & D investment [3], internal and external environment of enterprises [4], institutional pressure [5] and energy consumption constraint target [6]. From the existing research, few scholars discuss the driving process of low-carbon innovation from the green entrepreneurship theory. Innovation flexibility, as a capability of start-ups, can effectively reduce the risk and uncertainty brought by innovation through rapid adjustment of innovation resources and innovation strategies when facing environmental changes [7], which has an important impact on the driving process of enterprise low-carbon innovation. However, whether innovation flexibility can play an important role in the realization of low-carbon innovation is rarely involved in the existing research, which needs to be further explored.

The rest of this study is structured as follows. The section 2 organizes a theoretical analysis, and then puts forward our research hypothesis. The third section introduces our research methods. The results are presented in Section 4 and our main findings are discussed in Section 5. Section 6 concludes this study, and puts forward our research limitations and future research directions.

2. Theoretical Analysis and Research Hypothesis

2.1 Green Entrepreneurship Orientation and low-carbon innovation

At the same time, green entrepreneurship orientation can also strengthen the fault-tolerant rate and anti-frustration ability of enterprises in the process of putting together green resources, and enhance the enthusiasm of organization members to participate in the process of green resource bricolage. In addition, driven by the green entrepreneurship orientation, it is easier for enterprises to integrate existing resources through green resource bricolage, break the convention and find another way in the competition, act immediately in the face of opportunities, and create new ways to solve

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existing problems quickly [8]. In the continuous trial and error patching of green resources, enterprises promote the existing green resources to reach the optimal combination state [9]. This process is bound to bring low-carbon innovation results in process and process. It can be seen that the green resource bricolage can further develop and utilize the existing resources, create new value different from the past, and then realize the innovation of new enterprises in products, processes and so on. It can be seen that the green resource bricolage may play a bridge role in the relationship between green entrepreneurship orientation and low-carbon innovation. That is, green entrepreneurship orientation promotes low-carbon innovation of enterprises by enhancing the ability to piece together green resources. Based on this, this study proposes the following assumptions:

H1: Green entrepreneurship orientation has a positive impact on green innovation.

2.2 The Moderating effect of Innovation Flexibility

Innovation flexibility refers to the ability of enterprises to quickly seize opportunities and adjust strategies in the face of changing environment, and then launch new products, new processes and new services. Innovation flexibility greatly improves the efficiency of enterprises in using resources and provides favorable support for enterprises to carry out innovation practice. When enterprises have strong innovation flexibility, the probability of enterprises carrying out low-carbon innovation practice is effectively improved. Therefore, innovation flexibility may become the catalyst of low-carbon innovation. Under the interaction of green entrepreneurship orientation and innovation flexibility, enterprises can carry out low-carbon innovation practice more effectively, and the relationship between green entrepreneurship orientation and low-carbon innovation may be strengthened. Based on the above analysis, this study puts forward the following assumptions:

H2:Innovation flexibility plays a positive moderating role between green entrepreneurship orientation and low-carbon innovation.

Low-carbon innovation is an innovative model that takes into account technoloLIcal innovation, environmental protection and economic development. Green entrepreneurship orientation drives enterprises to adopt innovative thinking in the process of operation, so as to realize low-carbon innovation in products, services and processes.At the same time, innovation flexibility greatly improves the efficiency of enterprises in using resources and provides favorable support for enterprises to carry out innovation practice. When enterprises have strong innovation flexibility, under the catalysis of strong innovation flexibility, this path may bring a higher degree of low-carbon innovation practice. Based on the above analysis, this study puts forward the following assumptions:

H3: Innovation flexibility has a positive impact on the mediating effect of green resource bricolage.

3. Research Methodology

3.1 Sample Selection

This study takes start-ups as the research object to explore the relationship between green entrepreneurship orientation and low-carbon innovation. This study conducted research on enterprises in the eastern coastal areas, central regions, western regions and northeast regions of China. The formal research work lasted five months from October 2021 to February 2022.

3.2 Variable Measurement

Green entrepreneurship orientation. According to covin and Slevin (1991), green entrepreneurship orientation includes 10 items.Low-carbon innovation. According to Shu et al. (2016), low-carbon innovation includes 7 items.Green resource bricolage. The green resource bricolage scale draws on the research of Senyard et al. (2014) , it has a total of 4 items. Innovation flexibility. The scale of innovation flexibility mainly draws on the measurement method of Narasimhan et al. (1999).

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3.3 Reliability and Validity Test

Before the formal issuance of the questionnaire, the research team conducted a pre survey in Jilin Province of China, to ensure the rationality of the scale and the items in it, and repeatedly revised the items in the scale according to the results of the pre survey. According to the results of reliability analysis and factor analysis, the reliability and validity analysis meet the requirements.

4. Results

4.1 Direct Effects

Regression analysis results show that green entrepreneurship orientation has a significant positive impact on low-carbon innovation（ β = 0.533, P<0.01), therefore, hypothesis 1 of this study is valid.

4.2 Moderating effect

This study constructs interactive items of green entrepreneurship orientation, green resource bricolage and innovation flexibility, then set low-carbon innovation as the dependent variable, add control variables and interactive items in turn, and build a regression model. Model shows the regression results of the interaction between green entrepreneurial orientation and innovation flexibility impact on low-carbon innovation, from which we can see that the former has a significant positive impact on the latter（β＝0.550，p＜0.01）. It can be seen that the higher the degree of innovation flexibility, the stronger the positive impact of green entrepreneurship orientation on low-carbon innovation, which indicates that H2 was verified.

Bootstrapping method is used to verify the moderated mediating effect. we select model in the PROCESS plug-in installed in SPSS to run the data, and then determine the impact through index. The results show that in the context of green resource bricolage as the mediating variable, the moderating effect index of innovation flexibility on the indirect effect of green entrepreneurship orientation on low-carbon innovation is 0.152, and the confidence interval is [0.074, 0.196], which is excluding 0. Therefore, innovation flexibility can positively regulate the mediating role of green resource bricolage between green entrepreneurship orientation and low-carbon innovation, which indicates that H3 was verified.

5. Implications and Future Prospects

5.1 Theoretical Implications

Our study explores the driving mechanism of low-carbon innovation based on the green entrepreneurship orientation, which enriches the research on the promotion path of low-carbon innovation of start-ups. Previous scholars have done some research on the connotation of green entrepreneurial orientation and the relationship between green entrepreneurial orientation and enterprise performance and green competitive advantage. However, few scholars have deeply discussed the process of green entrepreneurial orientation enabling low-carbon innovation of enterprise. Previous scholars paid little attention to the important factors in the process of exploring the efficacy of green entrepreneurship orientation. While combining green entrepreneurship theory with resource bricolage theory, this study explores the important role of innovation flexibility in the process of driving mechanism of low-carbon innovation, which provides a new perspective for the study of important factors in the formation of enterprise low-carbon innovation.

5.2 Practical Implications

This study explores the driving mechanism of low-carbon innovation of start-ups from the perspective of green entrepreneurship orientation, which provides a new perspective for the

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research in the field of green entrepreneurship.in the process of low-carbon innovation practice based on green entrepreneurship orientation, the role of innovation flexibility cannot be ignored. When start-ups with green entrepreneurship orientation want to piece green resources together, innovation flexibility can strengthen the fault tolerance and anti-frustration ability of start-ups in the process of green resource bricolage, Therefore, start-ups should pay attention to improving their innovation flexibility, accelerate the transformation process from green resources to green products and services, and create conditions for enterprises to carry out low-carbon innovation.

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References

[1] Porter, M. E.; Vander, L. C. Green and Competitive: Ending the Stalemate. Harvard Business Review,1995, 73,120-134.

[2] Fang, Z.; Kong, X.; Sensoy, A.; et al. Government's awareness of Environmental protection and corporate low-carbon innovation: A natural experiment from the new environmental protection law in China, Economic Analysis and Policy 2021,70,294-312.

[3] Wang, H.; Wang, S.; Miao Z. Heterogeneous threshold effect of R & D investment on low-carbon innovation Efficiency -- An Empirical Study Based on China's high-tech industry. Scientific Research Management, 2016, 37, 9.

[4] Xu, J.; Guan, J.; Lin, Y. Institutional pressure, executives' awareness of environmental protection and enterprise low-carbon innovation practice -- from the perspective of new institutionalism theory and high-order theory. Management Review, 2017, 29 , 72-83

[5] Cao, H.; Chen, Z. The driving effect of internal and external environment on Enterprise low-carbon innovation Strategy -- the regulatory role of executives' environmental awareness. Nankai Management Review, 2017, 20, 95-103

[6] Hu, D.; Huang, Y.; Zhong, C. Does Environmental Information Disclosure Affect the Sustainable Development of Enterprises: The Role of low-carbon innovation. Sustainability, 2021, 13,1-22.

[7] Kanovska, L. Are smart service manufacturing providers different in cooperation and innovation flexibility, in innovation performance and business performance from non-smart service manufacturing providers. EnLIneering Management in Production and Services, 2020, 12,105-116.

[8] Salunke, S.; Weerawardena, J.; Mccoll-kennedy, J.R. Competing through service innovation: The role of bricolage and entrepreneurship in project-oriented firms. Journal of Business Research, 2013, 66(8),1085-1097.

[9] Sun, R.; Zhou, Fei. Research on the relationship between enterprise social connection, resource bricolage and business model innovation. Journal of Management, 2017,12,1811-1818