Accounting and Corporate Management (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/acccm.2024.060301
ISSN 2523-5788 Vol. 6 Num. 3

Digital Transformation and Development of Renewable Resource Enterprises in the Context of Digitalization

Changjiang Yu[1,2,a,*], Yufei Qin[1,2,b], Daolong Zhu[1,2,c], Yuqing Liu[1,2,d]

[1]*Jiangxi University of Finance and Economics Postdoctoral Mobile Station Jiangxi Green Cycle Industry Co., LTD., Fengcheng, Jiangxi, China*
[2]*Postdoctoral Innovation Practice Base Jiangxi Green Cycle Industry Co., LTD, Fengcheng, Jiangxi, China*
[a]*207593@.qq.com*, [b]*qinyufei@ger.com.cn*, [c]*zhudaolong@ger.com.cn*, [d]*liuyuqin@ger.com.cn*
[*]*Corresponding author*

Keywords: Green Innovation, Digitization, Renewable Resources, Innovation Ecosystem

Abstract: How to improve the level of green innovation of enterprises is an important issue that needs to be solved behind the current strategy of developing a green and low-carbon circular economy. Adopting the qualitative comparison analysis based on Fuzzy-set method, from the perspective of "environment-subject" system, the configuration path that drives and affects the green innovation level of renewable resource enterprises is studied. It is found that: (1) variables such as digital foundation, environmental regulation, and government subsidies are not the single necessary conditions for the high-level green innovation of renewable resource enterprises, and the green innovation of enterprises is affected by the synergy and concurrency of multiple factors.(2) Three high-level configurations: "digital subject-driven", "environment driven", and "resource driven" are identified.(3) Renewable resource enterprises should combine their own innovative environment, differentiate and customize the high-level development path of green innovation, empower the development of green and low-carbon circular economy, and promote the achievement of dual carbon goals.

1. Introduction

Currently, China is facing enormous environmental challenges and resource pressures. As early as in strategic documents such as the Sustainable Development Agenda 2030, China clearly proposed to promote green technology innovation and development in order to achieve the goals of sustainable development and environmental protection. With the proposal of "carbon peak" and "carbon neutrality" goals, China has entered the era of fully promoting a green economy. Green innovation, as an important way to reduce carbon emissions and improve resource utilization efficiency, has become a crucial issue in achieving green, low-carbon, and sustainable development strategies. Among the many fields of green innovation, the renewable resources industry has received much attention. Through technological innovation and the application of green technology, waste can be transformed into valuable renewable resources, thereby extending the utilization cycle of resources, improving resource utilization efficiency, and reducing energy consumption.

[1]However, due to the current incomplete system and market development of renewable resources in China, green innovation has the characteristics of high complexity, high cost, high risk, and long cycle, leading to some challenges for renewable resource enterprises in terms of green innovation. Renewable resource enterprises have a small scale and low industrial concentration, and their own innovation and resource integration capabilities are limited, resulting in a lack of initiative in green innovation; In addition, the order of the renewable resources market is relatively chaotic, and there is a widespread asymmetry of market information. The circulation of innovative resources is poor, resulting in less cooperation between renewable resource enterprises and other innovative entities. The scope of collaborative innovation boundaries between enterprises is narrow and difficult to expand.

This article explores the factors and mechanisms that affect green innovation in renewable resource enterprises from the perspective of an innovation ecosystem. This study helps to deepen the understanding of green innovation in renewable resource enterprises, promote the improvement of green innovation level in renewable resource enterprises, and provide useful references for promoting the development of green, low-carbon, and circular economy.

2. Literature Review and Theoretical Foundations

Green innovation, derived from innovation, refers to the innovative activities of enterprises using science and technology to promote carbon reduction, reduce environmental burden, or improve resource utilization. At present, the Internet, big data and other new generation digital technologies are becoming the new driving force for the development of green innovation of enterprises. Scholars have carried out research on the impact of digitalization on green innovation from different perspectives: the research of Yu Zhihui and He Changlei shows that information infrastructure has significantly improved the level of urban green innovation, and pointed out that talent gathering, Internet level and digital finance have a promoting effect on it; Chen Fang and Liu Songtao's research points out that artificial intelligence technology has significantly improved the efficiency of urban green development through structural effects, innovation effects, and human capital effects; Liu Chang et al.'s research shows that digital transformation of enterprises can significantly improve their green innovation efficiency by strengthening media supervision and applying virtual simulation technology channels; Shen Minghao and Tan Weijie believe that digitization not only alleviates the problem of (environmental) information constraints, but also promotes independent participation of enterprises in environmental governance; Song Deyong et al. pointed out that digitization mainly promotes green technology innovation in enterprises by improving their information sharing level and knowledge integration ability; The research by Lun Xiaobo and Liu Yan indicates that digital government is conducive to stimulating the development potential of the digital economy and has a significant promoting effect on green technology innovation. It can be seen that the background of digital development is of great significance for improving the level of green innovation of enterprises, promoting green transformation of enterprises, and achieving the "dual carbon" goals. For renewable resource enterprises, the new generation of digital technology can provide key technical support for green manufacturing innovation, green transformation innovation, resource recycling and reuse innovation, and promote the improvement of enterprise green innovation level.[2-5]

However, the previous "one-on-one" innovation model is no longer applicable to the digital development era. Enterprises are gradually seeking innovation resources from governments, universities, research institutions, markets, etc. Innovation entities have established complex network relationships around innovation activities, and the green innovation model of enterprises has changed. Some scholars have begun to explore this new model of green innovation. Zeng

Jingwei and others proposed the concept of a green innovation ecosystem, defining it as a complex system that aims to enhance green innovation capabilities and promote the emergence of green innovation. Various innovation entities and the innovation environment continuously promote the development of green innovation through the flow and interaction of innovation elements, forming a symbiotic competition and dynamic evolution; Deng Xiaohui et al. constructed a multi factor green innovation ecosystem analysis framework based on the five helix factor analysis model, which includes government, enterprises, public society, universities, and the natural environment, laying a theoretical foundation for the research of green innovation ecosystems.[6-8]

In summary, under the background of digital development, green innovation in renewable resource enterprises is no longer an individual behavior of enterprises, but requires the collaborative assistance of digital development elements, social green development environment, and other innovation entities. Based on this, this article starts from the theory of green innovation ecosystem, studies the influencing factors of green innovation in renewable resource enterprises from two aspects: environment and subject, constructs a theoretical model for the development of green innovation in renewable resource enterprises, explores the path to improve their green innovation level, and provides important reference for the high-quality development of green innovation in renewable resource enterprises.

3. Analysis of the Mechanism for Improving the Green Innovation Level of 3 Renewable Resource Enterprises

3.1 Digitalization - Subject driven

In the context of digital development, the integration of data and reality enables the digitization and flow of innovative elements. Digital technology promotes efficient integration and collaboration of innovation resources among government, enterprises, universities, and research institutions through multiple information system integration platforms, thereby enhancing innovation momentum. As a typical case of this kind of configuration, Sichuan Province has vigorously promoted the green development of digital empowerment in recent years. Taking Chengdu as an example, it has built an ecosystem of "core screen end soft intelligent network", promoted the development of digital infrastructure, services and applications in the whole process, created "Chengdu intelligent manufacturing", promoted the deep integration of digital technologies such as big data, Internet, artificial intelligence and industrial green low-carbon, improved the collection, storage and transportation system of renewable resources, innovated and developed a new model of "Internet+renewable resources", actively promoted the recycling of waste resources such as construction waste and industrial solid waste, vigorously constructed a green technology innovation application system, and jointly arranged a number of green technology innovation centers with universities, research institutes and enterprises, promoted the construction of innovation platforms, and promoted the coordinated development of green technology innovation. Improve the level of green innovation.[9]

3.2 Environment driven

Under the dual drive of environmental regulations and consumer demand, enterprises can enhance their level of green innovation by utilizing innovative resources brought about by core conditions of digital integration and other marginal conditions. The integration of industrialization and digital HP finance can enhance the ability of enterprises to share information and integrate knowledge, accelerate industrial transformation and upgrading, and alleviate financing constraints, which can promote the improvement of green innovation level of enterprises. Among them, Tianjin,

as a typical case of this configuration type, has continuously improved the institutional environment for the recycling of renewable resources in recent years, and has introduced a series of implementation plans and policies, such as the "Tianjin 14th Five Year Plan Plastic Pollution Control Action Plan". Under strong environmental regulations in Tianjin, technological innovation has added impetus to the development of the renewable resources industry. The world's first "Environmental Protection Technology Industry Innovation Community" was launched at the first Beijing Tianjin Hebei Innovation and Development Conference held in Tianjin. Multiple banks have provided financing and credit for green and low-carbon projects on site, integrating innovative resources such as science and technology, funds, and technology, expanding the boundaries of the green innovation ecology of enterprises in the region, and promoting the improvement of the level of green innovation of enterprises.[10]

3.3 Resource driven

On the basis of digital operation, enterprises can effectively achieve green innovation by combining their own resource capabilities with abundant innovative talent resources. Enterprises do not absorb redundancy to provide resource reserves for green innovation and have a positive impact on corporate performance through green management practices; In addition, the digital foundation can promote the green structured transformation of enterprises, assist in the marketization of green innovation, and introduce more resource reserves from peer enterprises, enrich the knowledge and talent resources of green innovation in enterprises. Among them, Beijing is a typical case of this configuration type. In 2022, Beijing achieved 100% green power supply to all venues for the first time in Olympic history. As the capital and science and technology innovation center of China, Beijing not only has a complete digital infrastructure and the widespread application of advanced digital technologies such as artificial intelligence, but also gathers talent resources from top universities and research institutions in China. At the same time, Beijing has numerous large enterprises and innovation and entrepreneurship platforms, and these enterprises have rich resources and market experience, providing broad cooperation opportunities and resource sharing platforms for renewable resource enterprises, promoting continuous breakthroughs in the field of green innovation, and accelerating the improvement of green innovation level.

4. Research Conclusions and Inspirations

4.1 Research Conclusion

Based on the results of conditional configuration analysis and the exploration of the mechanism for enterprises to improve their green innovation level mentioned above, the following research conclusions are further summarized:

(1) Government subsidies and other seven antecedent conditions cannot be used as a single necessary condition for improving the level of green innovation. The antecedent variables of green innovation in renewable resource enterprises can be combined in different ways, which may not only enhance the high level of green innovation in enterprises, but also lead to low levels of green innovation in enterprises. This results in a causal and asymmetric relationship between high and non high levels of green innovation.

(2) This article obtains 5 equivalent differentiation paths to enhance the level of green innovation in enterprises, which are divided into 3 categories based on core conditions: "digitalization subject driven" with government subsidies, universities and research institutions, digital foundation, and digital integration as core conditions; An "environment driven" model with digital integration and environmental regulation as the core conditions and consumer demand as the marginal conditions;

A resource driven approach with universities and research institutions, unabsorbed redundancy, and digital foundations as core conditions.

4.2 Research inspiration

Based on the research findings, this article proposes suggestions from both renewable resource enterprises and the government.

For enterprises:

(1) This study builds a green innovation ecosystem and carries out collaborative innovation in cooperation with multi-stakeholders such as industry, universities, research institutes, government and finance. This study expands the spatial scope and boundary of enterprise green innovation, promotes knowledge sharing and multi-dimensional integration of resources, and enhances the driving force of enterprise green innovation.

(2) This research accelerates the organic integration of the whole process of digitalization and green innovation, including the development of intelligent recycling systems, the implementation of waste traceability based on blockchain technology, and the improvement of waste recycling efficiency. In this study, the Internet of Things, artificial intelligence and other technologies are used to collect real-time waste data and realize information management of waste resources. This study uses intelligent simulation and prediction techniques to reduce the opportunity cost of green innovation and improve the efficiency of resource regeneration.

For the government:

(1) This study improves the incentive policy system of enterprise green innovation. This study encourages renewable resource enterprises to develop new technologies, new products and new services by means of financial subsidies, tax incentives and green innovation funds to promote their investment and enthusiasm in the field of green innovation.

(2) Strengthen technical support for green innovation. This study builds an exchange and consultation platform for green innovation and development of renewable resources, provides technical consultation and resource exchange opportunities for enterprises, and promotes cross-border cooperation among enterprises. This study promotes enterprises to understand the application of digital technology, promote the construction of digital platforms, integrate innovation resources and market information, and enhance enterprises' green innovation ability.

(3) Enhance public environmental awareness and create favorable conditions for green innovation and development. By strengthening environmental laws and regulations, creating environmental demonstration projects, promoting green consumption, and organizing environmental activities, we aim to attract public attention and participation in environmental protection, thereby increasing market demand and accelerating the promotion and application of renewable resource technologies and innovative achievements.

References

[1] Yu Bai, Siyi Song, Jianling Jiao, Ranran Yang. The impacts of government R&D subsidies on green innovation: Evidence from Chinese energy-intensive firms[J]. Journal of Cleaner Production, 2019

[2] Wicki Samuel, Hansen Erik G. Green technology innovation: Anatomy of exploration processes from a learning perspective [J]. Business strategy and the environment, 2019

[3] Gema Albort-Morant, Antonio Leal-Millán, Gabriel Cepeda-Carrión. The antecedents of green innovation performance: A model of learning and capabilities[J]. Journal of Business Research, 2016

[4] Baris Yalabik, Richard J. Fairchild. Customer, regulatory, and competitive pressure as drivers of environmental innovation [J]. International Journal of Production Economics, 2011

[5] Philipp Gölzer, Albrecht Fritzsche. Data-driven operations management: organisational implications of the digital transformation in industrial practice [J]. Production Planning & Control, 2017

[6] Jun Shan, Shitao Yang, Shilei Yang, Jin Zhang. An Empirical Study of the Bullwhip Effect in China[J]. Production

and Operations Management, 2014
[7] Simon Chanias, Michael D. Myers, Thomas Hess. Digital transformation strategy making in pre-digital organizations: The case of a financial services provider[J]. Journal of Strategic Information Systems, 2019
[8] Sambit Lenka, Vinit Parida, Joakim Wincent. Digitalization Capabilities as Enablers of Value Co-Creation in Servitizing Firms [J]. Psychology & Marketing, 2017
[9] Kuen-Hung Tsai, Teresa Tiaojung Hsu. Cross-Functional collaboration, competitive intensity, knowledge integration mechanisms, and new product performance: A mediated moderation model[J]. Industrial Marketing Management, 2013
[10] Riitta Katila, Gautam Ahuja. Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction[J]. The Academy of Management Journal, 2002