Exploring the Factor in Driving Green Innovation in Manufacturing Enterprises in China

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ABSTRACT

The aim of this research is to explore the impact of green knowledge sharing, green dynamic capabilities, and business model innovation on green innovation in manufacturing enterprises, with an in-depth examination of the mediating role of business model innovation. Utilizing a quantitative approach through questionnaire surveys, this study employs various theoretical frameworks such as business model theory, knowledge-based perspectives, sustainable development theory, natural resource-based views, and green dynamic capabilities theory. This research aims to validate and analyze the SEM model constructed, summarizing recommendations for promoting green innovation in the Chinese manufacturing industry. Simultaneously, this research seeks to expand the understanding of corporate green innovation and provide guidance to nations and businesses interested in engaging in green innovation.
Keywords:green innovation;factor;manufacturing enterprises

Introduction

Global economies grapple with mounting environmental challenges while chasing continuous growth, emphasizing the delicate equilibrium between economic expansion and environmental preservation(Madan Shankar et.,al (2015). In China's economic landscape, manufacturing enterprises act as critical growth engines yet significantly contribute to issues like climate change and resource depletion(Xinhua News Agency, 2022;Xinhua News Agency, 2021;China Government Network, 2015;xinhuashe, 2021). Consequently, their role in meeting environmental goals becomes pivotal. The rising importance of green initiatives is underscored by China's strides in advancing the green economy and sustainable development(Zhang et al., 2022). Therefore, active involvement by Chinese manufacturing enterprises in fostering a green economy and sustainable practices becomes a strategic imperative. Despite progress, challenges persist in green innovation within these enterprises, including limited capabilities, managerial awareness, and the need for innovative green business models(Zhang et al., 2018). This sustains the significance of exploring green innovation from global, national, and enterprise perspectives(Du & Li, 2019). Green

innovation stands as a key driver for enterprises pursuing sustainable development, necessitating its prioritization to combat environmental issues effectively(Li et al., 2019). Yet, amid evolving business landscapes and amplified uncertainties, strategic deployment of green strategies, resource optimization, and bolstering dynamic capabilities become vital to drive green innovation (Ma et al., 2022). Understanding the role of green innovation in enterprise development becomes a crucial focal point for managers (Karimi et al., 2021).

Research Question

Researchers aim to uncover influential factors in green innovation, with prior studies highlighting the significance of green knowledge sharing and dynamic capabilities in promoting this innovation. Yet, the role of business model innovation remains under explored in this context. This study seeks to elucidate the relationship among these elements using diverse theoretical frameworks. Drawing from Business model theory, knowledge-based perspectives, sustainable development theory, the natural resource-based view, and green dynamic capabilities theory, it aims to enrich comprehension of enterprise green innovation. By addressing these factors, this research endeavors to offer guidance for nations and businesses keen on advancing green innovation. The study is structured around three primary inquiries:

1. What are the levels of green knowledge sharing, green dynamic capabilities, business model innovation, and green innovation in manufacturing enterprises in Guangxi province?
2. How do green knowledge sharing, green dynamic capabilities, and business model innovation affect green innovation in manufacturing enterprises in Guangxi province?
3. How can the proposed framework be utilized to explain the level of green innovation in enterprises?

Research Objective

This study seeks to investigate how green knowledge sharing and green dynamic capabilities influence green innovation in manufacturing enterprises by exploring the role of business model innovation. The specific objectives of this study are:

1. To investigate the relationship of green knowledge sharing, green dynamic capabilities, business model innovation and green innovation;
2. To test the validity of a conceptual framework of green knowledge sharing, green dynamic capabilities, business model innovation and green innovation
3. To explain the green innovation mechanism in manufacturing enterprises by using the proposed framework.

Definition and Framework

1. G reenInnovation) GI)

Based on the definition provided by Chen and Zwick (2018), in this paper, green innovation refers to activities related to the development of innovative products/services and process

technologies with the aim of reducing production costs, improving efficiency, and mitigating environmental impacts in business operations.

2. Green Knowledge Sharing) GKS(

The research focuses on green innovation in manufacturing companies along the supply the ,(2016) and Zhang Li (2019) .awing on the studies by Song et aldr ,Therefore .chain .chain perspective definition of green knowledge sharing is proposed from a supplyGreen knowledge sharing involves the exchange and dissemination of valuable information related to environmentally friendly practices among members of the supply chain. The purpose is to achieve mutual benefit and promote the development of green technologies and identification of new market opportunities (Xu et al., 2021).

3. G reenD ynamicCG) apabilitiesDC (

Based on the definition and research ofgreen dynamic capability by former scholars, we define green dynamic capability as a part of dynamic capability, is a further deepening and continuation of the concept of dynamic capabilities. It refers to the high-level capability of enterprises to achieve sustainable and green development in a constantly changing environment. Green dynamic capability emphasizes the integration, construction, and reconfiguration of internal and external resources with a focus on environmental protection (Li et al., 2019).

4. Business Model Innovation) BMI(

This study adopts the definition of business model innovation as the renewal and improvement of existing business models, which involves the reconstruction of value propositions and business logic, and the exploration of new ways to acquire value. The primary focus of business model innovation is to discover new revenue streams and define value propositions for customers, suppliers, and partners (Zott et al., 2011).

5.Framework

The objective of this study is to explore the connection between green knowledge sharing, green dynamic capabilities, and green innovation in manufacturing enterprises. It also examines the mediating role of business model innovation in this relationship. To achieve this objective, we have developed a conceptual framework in Figure 1 based on our assumptions.

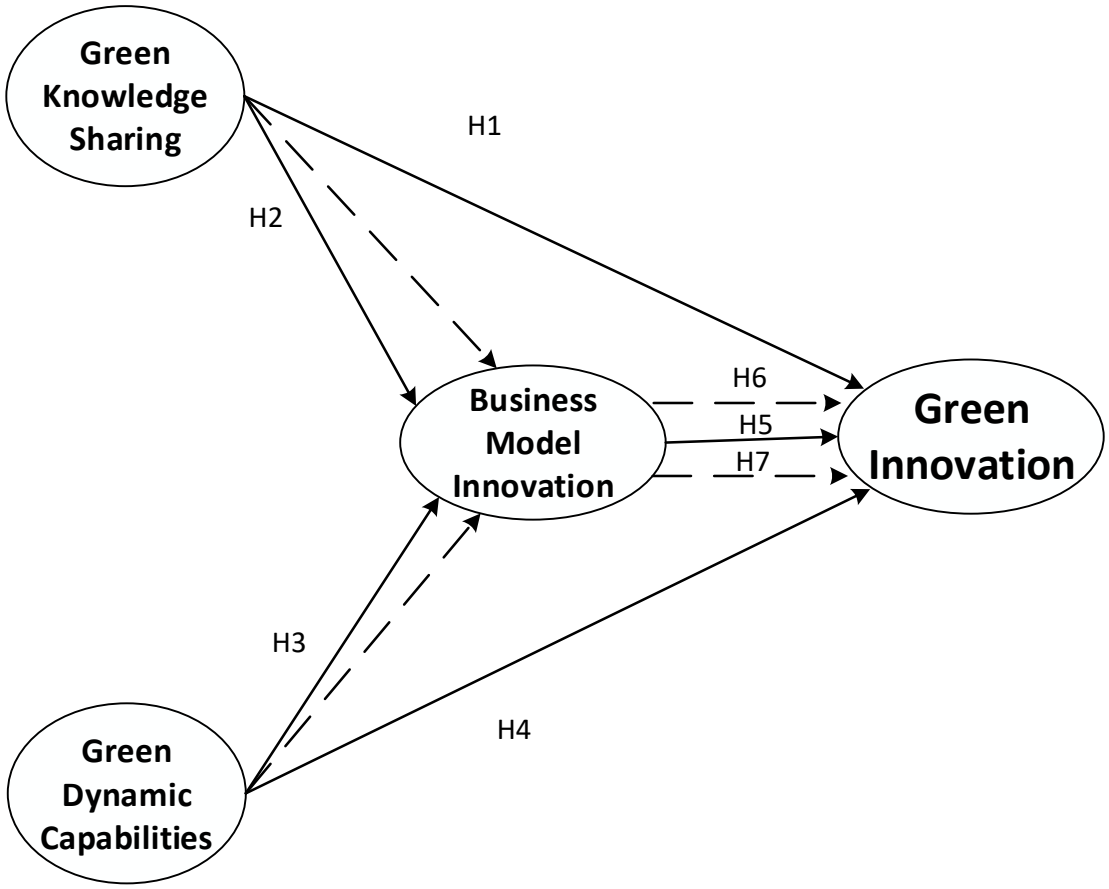

Figure1 Conceptual Framework

METHODOLOGY

This study's primary objectives involve examining and testing the relationship between green knowledge sharing, green dynamic capabilities, business model innovation, and green innovation. Additionally, the study aims to model the relationship between these constructs using Structural Equation Modeling (SEM) with Smart PLS.

1. Quantitative research design

The train of thought for quantitative research is as follows: create a scale based on variables, develop a questionnaire, collect data, and then conduct data analysis, which involves: according to Chapter 2, this study involves four variables, including: green knowledge sharing, green dynamic capabilities, business model innovation, and green innovation. All variables are latent variables that cannot be directly measured. Therefore, through theoretical analysis, this study infers that the corresponding observed variables for these 4 latent variables.

Green knowledge sharing was divided into 2 dimensions: green supplier sharing, green customer sharing,each dimension was measured by 5 items.

Green dynamic capabilities were divided into 3 dimensions: green resource integration capability, green resource reconfiguration capability, environmental insight capability, which a total of 15 items used for measurement

Green Innovation was divided into 2 dimensions green product/service innovation, and green process innovation, each dimension was measured by 4 items. Product/service innovation was measured by 4 items.

Business model innovation was divided into 2 dimensions: Noval business model innovation, and Efficient business model innovation, and measured by 11 items.

Based on the above items, a scale was developed, three are total 44 items and the questionnaire were designed to ensure that all items were measured on 5-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree), the constructs' details and items are listed , and then data was analyzed.

In order to analyze the level of green innovation with the collected data, SPSS26.0 will be used for statistical analysis, which includes descriptive analysis, validity analysis, factor analysis, and validation analysis. Smart PLS software will be used to process the multiple variables, and the multivariate equation will be utilized to analyze and verify the relationship between the variables, in order to build the basic model of green innovation.

2. Population and Sampling

In this study, the population were managers in manufacturing enterprises in 2 cities: Nanning, Liuzhou. These cities are where manufacturing enterprises congregate in Guangxi province. These enterprises include those involved in automotive, steel, machinery manufacturing, cement, and other industries that prioritize environmental management.

Samples will be collected from 2 cities in Guangxi, where manufacturing industries are concentrated through a combination of stratified sampling and simple random sampling.

3. Design of questionnaire

A questionnaire survey was used to collect data in this study. The design of the questionnaire content directly affects the effectiveness and feasibility of the research.Based on the sample, we will design 440 questionnaires and conduct interviews with 440 managers.

4. Data Collection

Based on the sample,the researcher sends investigators to distribute printed questionnaires to respondents, explain the significance and requirements of the survey, and request their cooperation in completing the questionnaire. The respondents answer the questions one by one, and the investigators explain any questions that are unclear. Once the respondents complete the questionnaire, the investigators retrieve the questionnaires promptly.

5. Analysis and Statistical Treatment

This study utilized descriptive statistical analysis to comprehend data categories, central tendencies, and dispersion trends employing measures such as Mean, Median, Mode, and Std. deviation. It conducted principal component analysis to evaluate variables' communality, emphasizing factors capturing over 80% of the original variables' information. Reliability analysis, utilizing Cronbach's alpha, assessed internal consistency, while correlation analysis

measured relationships between variables using Pearson and Spearman coefficients. Multiple linear regression was employed to predict and control dependent variables in the analysis.

Further Research

Following the extensive groundwork in exploring the factors driving green innovation in manufacturing enterprises, the next phase involves meticulous data analysis. The collected data from the questionnaire surveys will undergo rigorous statistical treatment, including but not limited to descriptive statistical analysis, principal component analysis, reliability analysis, correlation analysis, and multiple linear regression. These analytical methods aim to unravel the intricate relationships between variables such as green knowledge sharing, green dynamic capabilities, business model innovation, and green innovation. Moreover, the SEM model constructed with Smart PLS will be subjected to validation and analysis, providing insights into the interplay among these constructs. This analytical phase seeks to consolidate and validate the proposed framework, thereby culminating in a comprehensive understanding of the factors impacting green innovation in Chinese manufacturing enterprises.

REFERENCES

Albort-Morant, G., Leal-Rodríguez, A. L., & De Marchi, V. (2018b). Absorptive capacity and relationship learning mechanisms as complementary drivers of green innovation performance. Journal of Knowledge Management.

Amit, R., & Zott, C. (2001). Value creation in e-business. Strategic Management Journal, 22(6–7), 493–520.

Ar, I. M. (2012). The Impact of Green Product Innovation on Firm Performance and Competitive Capability: The Moderating Role of Managerial Environmental Concern. Procedia - Social and Behavioral Sciences, 62, 854–864. https://doi.org/10.1016/j.sbspro.2012.09.144

Betts, T. K., Wiengarten, F., & Tadisina, S. K. (2015). Exploring the impact of stakeholder pressure on environmental management strategies at the plant level: What does industry have to do with it? Journal of Cleaner Production, 92, 282–294.

Bhatti, S. H., Santoro, G., Khan, J., & Rizzato, F. (2021). Antecedents and consequences of business model innovation in the IT industry. Journal of Business Research, 123, 389–400. https://doi.org/10.1016/j.jbusres.2020.10.003

Bock, A. J., Opsahl, T., George, G., & Gann, D. M. (2012). The effects of culture and structure on strategic flexibility during business model innovation. Journal of Management Studies, 49(2), 279–305.

Camisón, C., & Monfort-Mir, V. M. (2012). Measuring innovation in tourism from the Schumpeterian and the dynamic-capabilities perspectives. Tourism Management, 33(4), 776–789.

Chen, Y.-S., & Chang, K.-C. (2013). The nonlinear effect of green innovation on the corporate competitive advantage. Quality & Quantity, 47, 271–286.

Chen, Y.-S., Lin, Y.-H., Lin, C.-Y., & Chang, C.-W. (2015). Enhancing green absorptive capacity, green dynamic capacities and green service innovation to improve firm performance: An analysis of structural equation modeling (SEM). Sustainability, 7(11), 15674–15692.

Cheng, C. C. J. (2020). Sustainability Orientation, Green Supplier Involvement, and Green Innovation Performance: Evidence from Diversifying Green Entrants. Journal of Business Ethics, 161(2), 393–414. https://doi.org/10.1007/s10551-018-3946-7