

Research on the Countermeasures to Accelerate the Green (Low-carbon) Transformation and Upgrading of Traditional Industries in Anshan

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Abstract

This study aims to deeply explore the countermeasures of green (low-carbon) transformation and upgrading of traditional industries in Anshan, and to conduct a systematic empirical study by using fuzzy set qualitative comparative analysis (fsQCA) method on manufacturing enterprises in Anshan. The research results show that the green transformation of traditional industries is affected by many factors, including the innovation of enterprise green ability, leadership support, employee participation, government policy support and market demand upgrading. By constructing the theoretical model under the framework of TOE (technology-organization-environment), the action mechanism of these factors in the green transformation of traditional industries is revealed. The study found that the green transformation paths of traditional industries in Anshan are diversified, including enterprise-oriented, internal and external coordination-driven, market demand and employee participation coordination-driven, and government policy-oriented. These paths have their own characteristics, which jointly promote the green process of traditional industries in Anshan. This study provides a valuable reference for the government to formulate relevant policies and enterprises to implement green transformation and upgrading, and helps to promote the green development of Anshan economy and achieve a win-win situation between economic development and environmental protection.

Keywords

Traditional Industry; Green (Low Carbon); Transformation and Upgrading; Configuration Research.

1. Introduction

In his 20th CPC report, General Secretary Xi Jinping stressed that promoting green and low-carbon economic and social development is a key link in achieving high-quality development. This highlights the urgency and importance of accelerating the green transformation of the development model. In the background of the replacement of old and new industries, traditional industries are still an important force for economic growth. However, resource and environmental constraints are increasingly prominent, and the traditional development model is unsustainable. Therefore, promoting the green transformation and upgrading of traditional industries has become an inevitable requirement for the green economic development and the construction of ecological civilization. Green transformation not only involves the technological transformation and upgrading of traditional industries, improving resource utilization efficiency and reducing environmental pollution; but also means the optimization and upgrading of industrial structure, cultivating emerging industries and building a green and low-carbon circular economy system. This will enable traditional industries to get rid of resource bottlenecks, enhance market competitiveness, and promote the benign interaction between

economic development and environmental protection. The government, enterprises and all sectors of society should work together to promote green transformation. The government should strengthen policy guidance and supervision, and provide preferential policies to encourage enterprises; enterprises should actively fulfill their social responsibilities, promote technological innovation and industrial upgrading; the society should enhance environmental protection awareness and advocate green consumption. In short, promoting the green transformation and upgrading of traditional industries is the only way to achieve green economic development and build ecological civilization, and is the key to achieve a win-win situation between economic development and environmental protection.

2. Theoretical Model Construction of Green (Low-carbon) of Traditional Industries under the Framework of TOE

2.1. Analysis of the Influencing Factors of the Green (Low Carbonization) of Traditional Industries under the Framework of TOE

The transformation and upgrading of traditional industries is a complex and key process, which involves the adjustment of industrial structure, the promotion of technological innovation, the optimization of policy environment and other aspects. When exploring its transformation path and strategy, green and low carbonization have become an important direction that cannot be ignored. In order to have a deeper understanding of the research status and practical experience in this field, this paper has conducted an extensive collection of relevant literature. Considering the research background and practice differences in the transformation and upgrading of traditional industries at home and abroad, the scope of literature search is mainly Chinese journals. The search of "transformation and upgrading of traditional industries" was used as the key word, and 20 documents involving green or low carbonization with high correlation degree, high citation amount and recent years were selected. These documents not only discuss the necessity and feasibility of the transformation and upgrading of traditional industries, but also deeply analyze the role and influence of green and low carbon, which provides an important reference for this paper to build the analysis framework of green (low carbon) influencing factors in the transformation and upgrading of traditional industries.

Based on the retrieved literature, through the author's in-depth thinking and integration, this paper determined the main factors affecting the green (low carbon) in the transformation and upgrading of traditional industries, and summarized them into three general directions: technical level, organizational dimension and environmental policy level.

At the technical level (T), this paper mainly considers the impact of advanced technologies such as industrial Internet, big data analysis, intelligent robot, digital twin and so on on the green innovation ability of enterprises. These technologies can not only improve production efficiency, but also promote the efficient use of resources and the sustainable development of the environment, thus promoting the green transformation of traditional industries.

In the organizational dimension (O), this paper highlights the importance of leadership support, employee engagement, platform organizational structure, cross-department collaboration, and dynamic resource integration. The support of leaders provides a clear direction and motivation for employees, and the active participation of employees promotes the emergence and practice of innovative ideas. At the same time, platform-based organizational structure, cross-departmental collaboration capabilities and dynamic resource integration can help break the barriers of traditional organizations, improve the flexibility and response speed of organizations, and provide a strong organizational guarantee for green transformation.

At the level of environmental policy (E), this paper mainly considers the impact of government policy support (such as digital economy planning), market demand upgrading (such as green consumption) and the impact of international competition pressure on the green

transformation of traditional industries. The policy support of the government provides policy guidance and financial support for the green transformation, the upgrading of market demand promotes the popularization and development of green products and services, and the international competition pressure urges enterprises to continuously improve their green competitiveness to cope with the challenges of the global market. The following will explain the mechanism of green (low carbon) from these factors.

2.1.1. Technical Dimensions

Green innovation strategy is crucial to the development of enterprises, which can improve enterprise performance, and indirectly achieve this goal by shaping the green image and enhancing the core capabilities⁰. Green dynamic capability is the key bridge for resource-based enterprises to transform green innovation into competitive advantage [2]. At the same time, the green innovation of enterprises has the same industry and group effect. In the process of green innovation, traditional manufacturing industry is faced with problems such as insufficient technological capacity and weak awareness of transformation, so corresponding countermeasures, such as strengthening technological innovation and improving the awareness of transformation, so as to promote green (low-carbon) transformation and upgrading and achieve sustainable development.

2.1.2. Organizational Dimension

(1) Leadership support

Leadership support is essential to promoting corporate green behavior and green innovation. The green transformative leadership of the CEO is the key factor, which has a profound impact on the green behavior of enterprises by building a culture of environmental responsibility and creating an environmental passion atmosphere [3]. This leadership style stimulates employees' enthusiasm and motivation for environmental protection, and encourages them to actively participate in green innovation activities. At the same time, green transformational leaders have a significant positive impact on the green behavior of employees, and environmental enthusiasm and pro-environmental organization atmosphere play an intermediary role [4]. CEOs with green experience can significantly improve the environmental performance of enterprises, especially in non-state-owned enterprises. [5]. To sum up, the leadership support, especially the green transformative leadership of the CEO, has an important impact on the green behavior and green innovation of enterprises, and provides strong support for the green (low-carbon) transformation of traditional industries.

(2) employee involvement

Employee participation plays a key intermediary role between green innovation strategy and enterprise performance. Research shows that employee participation can significantly improve corporate social performance, and have a positive impact on economic performance [6]. This is because the employees are the executors of the green innovation strategy, and their active participation ensures the effective implementation of the strategy, improves the performance of the enterprise in the social and environmental aspects, and thus enhances the overall competitiveness. Further, employee engagement influences employee green behavior through organizational identity and perception of work alienation [7]. Organizational recognition makes employees more identify with corporate values and are willing to contribute to green development; work alienation reduces the enthusiasm of employees to participate in green behaviors. In addition, green human resource management (Green HRM) is critical to stimulating employees' green behavior. [8]. Through environmental protection training and education, it improves employees' environmental awareness, creates an environmentally friendly atmosphere, encourages employees to participate in environmental protection activities, and forms a good environmental protection culture. To sum up, employee participation not only improves enterprise performance, but also affects the green behavior of

employees through working mechanisms such as organizational identity. Green HRM effectively stimulates the green behavior of employees by creating a positive atmosphere. All of which supports the view that employee support can promote the green (low-carbon) transformation of traditional industries.

2.1.3. Environmental Dimensions

(1) Government policy support

Government policy support is crucial to the development of low-carbon economy, and is the key to overcome market failure, promote technological innovation and industrial structure adjustment of [9]. Through diversified measures such as industrial policy, fiscal policy and financial policy, the government has formed a policy system to promote the low-carbon transformation [10]. For example, industrial policy guides the adjustment of industrial structure, fiscal policy provides incentives to reduce the cost of transformation, and financial policy provides financial support. In practice, the successful cases of government policy support such as Nanchang City and Beidaihe New District show their important role in promoting the low-carbon transformation of traditional industries [11][12]. In addition, government subsidies also support enterprises in technological innovation, improve profitability and growth capacity[13]. To sum up, government policy support plays a key role in promoting the green (low-carbon) transformation of traditional industries, providing strong support for the realization of sustainable economic development.

(2) Market demand upgrading

The rise of consumers' environmental preference and market competition is an important driving force to promote the green innovation of enterprises. Consumers' demand for environmental protection is increasing, prompting enterprises to increase green innovation efforts. At the same time, the intensified market competition also encourages enterprises to seek green innovation to gain competitive advantages. Inspur enterprises have realized green innovation through digital transformation and improved operational efficiency and competitiveness [14]. Guangxi Liuzhou Iron and Steel Group updates the internal capacity, realizes the green transformation of the whole life cycle, and enhances the environmental protection level and market competitiveness [15]. Green innovation such as green product strategy and processing route optimization not only meet the needs of environmental protection, but also improve the economic benefits of enterprises [16]. Shenzhen electronics manufacturing industry and others through the need to establish a green supply chain, promote the green transformation of the industry, improve the overall competitiveness and sustainable development capacity[17]. To sum up, the consumer environmental preference and the rising degree of market competition promote the green innovation of enterprises, which is an important factor to promote the green (low-carbon) transformation of traditional industries, and the upgrading of market demand plays an important role in promoting this.

2.2. Theoretical Model Construction

This paper builds the transformation and upgrading of the traditional industry green mechanism as shown in figure 1, contains the enterprise green ability innovation, government policy support, market demand upgrade, leadership support, employees to participate in the green innovation system will be driven by different combination path form the traditional industry green transformation and upgrading of the as a result of high level or low level.

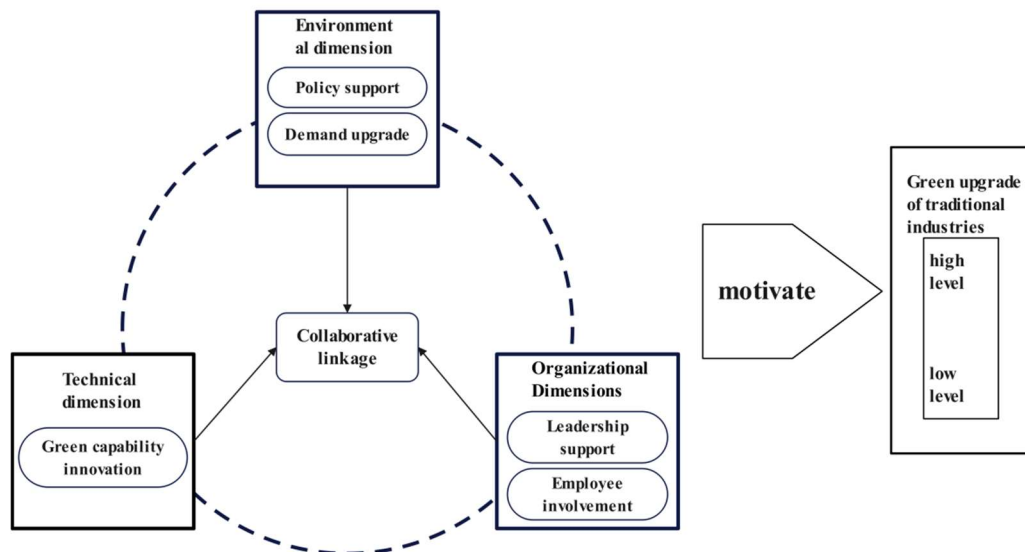


Figure 1. A. The conceptual model

3. Congroup Effect Analysis of Green Transformation and Upgrading of Traditional Industries

3.1. Sample Selection and Data Source

This paper adopts the questionnaire survey method to collect data from various manufacturing enterprises in Anshan city as a research sample. The questionnaire design is based on the antecedent conditions under the TOE framework (technology-organization-environment framework), and specially sets up the measurement questions on the green transformation. To accurately measure the variables, the questionnaire used the Likert five-point integration method, where "15" represents the different degrees from "complete disapproval" to "complete identity". A total of 350 questionnaires were distributed in this survey, and 347 valid questionnaires were finally recovered. The effective rate of the questionnaire was as high as 99.14%, which provided a solid data basis for the study of the green (low-carbon) transformation and upgrading countermeasures of the traditional industries in Anshan city.

3.1.1. The Reliability Analysis

The reliability of the questionnaire was assessed using SPSS 26.0 and the results are shown in Table 1. The questionnaire included a total of 26 test questions, and the overall clonal Bach coefficient α reached 0.803, exceeding the standard line of 0.7, which indicates the good consistency and stability of the data in our respondent population. The clonal Bach coefficient α was above 0.7 for all factors, so we have reason to believe that the test items of these studied variables have a high degree of consistency reliability.

Table 1. is used for scale reliability analysis

dimension	Clone of Bach, Alpha	number of terms
Enterprise green ability innovation	0.755	6
Leadership support	0.716	3
employee involvement	0.773	4
Government policy support	0.849	5
Market demand is upgraded	0.752	5
Green transformation of traditional industries	0.770	3
Overall scale	0.803	26

3.1.2. Validity Analysis

The results of the model fit test presented in Table 2 indicate that the CMIN / DF ratio is 2.489, falling into the ideal interval of 1 to 3; meanwhile, the RMSEA value of 0.066 also meets the criterion of less than 0.08. In addition, the test results of IFI, TLI and CFI all met the established requirements. In conclusion, the results of this analysis strongly prove that the CFA model of consumer purchase intention has a good adaptation.

Table 2. for scale validity analysis

metric		The measured results
CMIN/DF	1-3 for excellent, 3-5 for good	2.474
RMSEA	<0.05 were excellent and <0.08 was good	0.065
IFI	> 0.9 for excellent,> 0.8 for good	0.858
TLI	> 0.9 for excellent,> 0.8 for good	0.837
CFI	> 0.9 for excellent,> 0.8 for good	0.856

3.1.3. Analysis of Configuration Effects

(1) Data calibration

When using the qualitative comparative analysis method of fuzzy set (fsQCA) of fuzzy set, the conversion of condition factors and outcome indicators to the fuzzy value in the range of 0-1 is an important link, which is the so-called "variable calibration". The work at this stage is to transform various variables into the form of sets, a process depends on theoretical understanding and practical experience. This study refers to the three scales of 95%, 50% and 5% advocated by Larkin (2008) as the criteria for data calibration, to ensure that all calibrated sets fall in the range of 0~1 [17]. Generally, data calibration can be implemented in intuitive or indirect methods. The intuitive method is relatively simple, but the indirect method needs to set the appropriate fuzzy numerical distribution rules by the specialized personnel according to the relevant principles. In the indirect method, the assignment of set membership must be explicitly elaborated, which is a rather complex process. Therefore, we decided to use the software to use it to transform the previous factor and fruit score into a fuzzy rating[18].

From the calibration values calculated by SPSS, the values for all variables are listed in Table 5. These values were input into fsQCA software for processing and the sample data were uniformly transformed into fuzzy values between 0 and 1 through the function function. At the same time, the software is set according to the principle of qualitative comparative analysis method, and finally generates the truth table.

Table 3. Data calibration anchors

variable	Full membership value	Cross point value	No subordinate value at all
Enterprise green ability innovation	4.33	3.67	2.67
Leadership support	3.33	2.67	1.33
employee involvement	4.75	3.50	2.50
Government policy support	5.00	4.00	2.60
Market demand is upgraded	4.00	2.80	1.60
Green transformation of traditional industries	4.00	3.00	2.00

(2) Analysis of single-factor necessary conditions

Based on the existing FSQCA research results, we conducted the necessary tests to verify whether the existence of the conditions is reasonable; Table 6 shows that all the consistent

correlations are below the value of 0.9, which indicates that the association between these conditions and targets is not strong enough to support their existence -- A single impact factor cannot effectively affect the final results. Therefore, we can conclude that the key reason for promoting the green transformation and upgrading of traditional industries is not only one or more circumstances.

Table 4. Necessity analysis of the purchase intention of green products

condition variable	GP		~GP	
	Consistency	Coverage	Consistency	Coverage
Enterprise green ability innovation	0.676741	0.659079	0.646508	0.557967
~ Enterprise green ability innovation	0.546122	0.635485	0.604981	0.623846
Leadership support	0.571615	0.631591	0.633872	0.620660
~ Leadership support	0.656683	0.669309	0.623751	0.563380
employee involvement	0.647063	0.685597	0.570877	0.536025
~ employee involvement	0.562103	0.596471	0.665154	0.625483
Government policy support	0.661304	0.755419	0.524874	0.531326
~ Government policy support	0.589716	0.583437	0.758388	0.664909
Market demand is upgraded	0.611132	0.671907	0.592407	0.577183
~ Market demand upgrades	0.615427	0.630156	0.663253	0.601825

(3) Configuration analysis

After using fuzzy set qualitative comparative analysis (fsQCA), we got three types of solutions: simplification, transition, and complexity. In these three scenarios, a condition is considered as a critical factor if the condition appears only in the transition scheme is called a boundary factor [21]. According to the research results of Larkin (2008), we set the initial consistency threshold to 0.8. The results of the QCA analysis are shown in Table Table 8. Among them, there are 5 configurations (M1, M2, M3a, M3b, M4 and M 4) for the green transformation and upgrading of traditional industries, and their consistency is 0.84,0.84,0.84,0.86 and 0.82 respectively. The overall consistency of 0.81 is more than 0.80, indicating that these five configurations are sufficient conditions for the green transformation and upgrading of traditional industries. Where M3a, M3b constitute the equivalent configuration, namely their core condition as [39]. The following will deeply explore each combination of the green transformation and upgrading of traditional industries.

① Enterprise-led green transformation path

Enterprise green ability innovation (M1) plays a crucial core role. It is not only the internal driving force for enterprises to realize the green transformation, but also the key factor to lead the whole transformation process. The green ability innovation of enterprises covers technological innovation, management optimization, product innovation and other aspects. These innovation activities together constitute a solid foundation for the green transformation of enterprises. In this path, leadership support (M2) and employee participation (M3a) serve as important auxiliary factors within the enterprise, providing strong support for the green ability innovation of enterprises. The firm determination and clear strategy of the leadership point out the direction for the green transformation of the enterprise, while the active participation and suggestions of the employees provide a guarantee for the smooth implementation of the transformation process. The close cooperation and joint efforts between leaders and employees enable enterprises to move forward on the road of green transformation. At the same time, government policy support (M4), as an external driving factor, also plays an important role in this path. By formulating relevant policies, providing financial subsidies and giving tax incentives, the government provides strong policy support and guarantee for the

green transformation of enterprises. These policy measures not only reduce the costs and risks of enterprise transformation, but also enhance the confidence and motivation of enterprise transformation. Although the market demand upgrade (M3b) is not directly involved in this path, the strong driving force of internal factors such as the green ability innovation of enterprises still makes this path play an important role in promoting the green transformation of traditional industries. With the increasing consumer demand for environmental protection and low-carbon products, the upgrading of market demand will become an important force to promote the green transformation of traditional industries. In this "enterprise-led green transformation path", enterprises have accumulated valuable experience and advantages through internal factors such as green ability innovation, which has laid a solid foundation for the future to upgrade the market demand and achieve a higher level of green transformation.

② Internal and external collaborative promotion of the green transformation path

In the green transformation path of internal and external collaborative promotion, the four conditional variables of enterprise green ability innovation (M1), leadership support (M2), employee participation (M3a) and government policy support (M4) are closely connected, which together constitute a powerful driving force to promote the green transformation of traditional industries. As the core driving force, enterprise green ability innovation (M1) constantly promotes enterprises to innovate in technology, products and management, providing a steady stream of internal power for green transformation. Leadership support (M2) ensures the strategic direction and resource guarantee of the green transformation of the enterprise, and the firm determination and clear planning of the leadership provide strong support for the smooth implementation of the transformation process. Employee participation (M3a) is an indispensable part of the green transformation. The active participation and suggestions of employees not only enhance the cohesion and centripetal force of the enterprise, but also bring more innovative ideas and implementation plans for the transformation process. The green awareness and environmental protection behavior of employees have also become an important embodiment of the green transformation of enterprises.

Government policy support (M4), as an external driving force, provides policy guidance and support for the green transformation of enterprises. By formulating relevant policies, providing financial subsidies, and giving tax incentives, the government has reduced the costs and risks of enterprise transformation, and enhanced the confidence and impetus of enterprise transformation. The close cooperation and joint efforts between the government and enterprises have formed a good situation of internal and external collaborative promotion. Although market demand upgrading (M3b) is not directly marked as participation in this path, the strong synergistic effect of other conditional variables is enough to promote the process of green transformation of traditional industries. With the increasing consumer demand for environmental protection and low-carbon products, the upgrading of market demand will become an important force to promote the green transformation. In this green transformation path of internal and external collaborative promotion, the enterprise has laid a solid foundation for upgrading the market demand and realizing a higher level of green transformation through the synergistic effect of conditional variables such as green ability innovation, leadership support, employee participation and government policy support.

③ Market demand and employee participation are a collaborative and driven green transformation path

"Market demand and employee participation collaborative driven green transformation path" is a unique transformation path. In this path, employee participation (M3a) and market demand upgrade (M3b), as the equivalent configuration, work hand in hand to become the core driving force to promote the green transformation of traditional industries. Employee participation is an indispensable part of the green transformation. Employees are in the production line, and they have the most intuitive and in-depth understanding of the operation process, technical

characteristics and market demand of the enterprise. Their active participation and suggestions not only provide valuable innovative ideas and implementation plans for the green transformation, but also enhance the cohesion and centripetal force of the enterprise, making the transformation process more smooth and efficient. Market demand upgrading is another big driving force to promote the green transformation. With the increasing consumer demand for environmental protection and low-carbon products, the upgrading of market demand has become an important direction to guide the green transformation of enterprises. Only by keeping up with the pace of market demand, constantly adjusting and optimizing the product structure and production process, can enterprises remain invincible in the fierce market competition. In this path, the synergistic effect of employee participation and market demand upgrading is particularly prominent. The active participation and innovation awareness of employees enable enterprises to better capture and meet the market demand, and promote the green upgrading of products and services. At the same time, the upgrading of market demand also provides a broader stage and more opportunities for employees, stimulating their enthusiasm for innovation and creativity. In addition, enterprise green ability innovation (M1), leadership support (M2) and government policy support (M4) also participate in this process to some extent. The enterprise green ability innovation provides technical support and guarantee for the transformation; leadership support ensures the strategic direction and resource input of the transformation; government policy support provides policy guidance and support for the transformation. The combined action of these factors makes the "collaborative driven green transformation path of market demand and employee participation" more perfect and feasible.

④ Government policy-led green transformation path

"Government policy-led green transformation path" is a transformation path that emphasizes the leading and promoting role of government policies. In this path, the government policy support (M4), as the core condition variable, plays a vital role, providing a strong policy guarantee and driving force for the green transformation of traditional industries. The government has formulated a series of policies and measures to encourage green transformation, such as providing financial subsidies, tax incentives, research and development support, etc., which reduces the costs and risks of enterprise transformation, and enhances the confidence and motivation of enterprise transformation. These policies and measures not only directly promote the green technological innovation and industrial upgrading of enterprises, but also promote the recognition and acceptance of green and low-carbon products by guiding market demand and consumer behavior. In this path, although enterprise green ability innovation (M1), leadership support (M2), employee participation (M3a) and market demand upgrading (M3b) also participate in the process of green transformation to a certain extent, the support and guiding role of government policies is particularly prominent. Under the guidance of the government policy, the green ability innovation can achieve technological breakthrough and industrial upgrading; the leaders supports the participation of the enterprise in the practice of green transformation under the guidance of the government policy, forming strong demand for green and low-carbon products. Therefore, it can be said that "the government policy-led green transformation path" is a transformation path with the government policy as the core and the joint participation of enterprises, leaders, employees and the market. In this path, the support and guiding role of government policies has been fully brought into play, providing a strong policy guarantee and driving force for the green transformation of traditional industries.

Table 5. Consumers' willingness to buy green products

condition variable	M1	M2	M3a	M3b	M4
Enterprise green ability innovation	●	●	●		●
Leadership support	●	●		●	⊗
employee involvement	●		●	●	⊗
Government policy support	●	●	●	●	●
Market demand is upgraded		●	●	●	⊗
Raw consistency	0.324509	0.300211	0.353481	0.302603	0.244333
Unique coverage	0.0330488	0.0147306	0.0631625	0.0293526	0.0463663
consistency	0.836837	0.841407	0.840506	0.856461	0.821454
Solution coverage	0.50742				
Solution consistency:	0.80655				

Note that if the core condition exists, the edge condition is there, and where it is missing if the core condition is missing.

4. Study Conclusion and Recommendations

① Suggestions for enterprises

In the exploration and practice of the green transformation of traditional industries, a variety of unique transformation modes have been formed. The enterprise-led path highlights the dominant position and core role of enterprises in the transformation process, and emphasizes that the green ability innovation of enterprises is the key driving force to promote the transformation. Through the research and development of new technologies, optimize the production process, improve product environmental performance and other measures, enterprises constantly enhance their green competitiveness. At the same time, the firm support of the leadership and the active participation of the employees provide a solid internal guarantee for the transformation. The decision and impetus of the leaders make the green transformation a strategic choice of the enterprise, while the extensive participation of the employees ensures the effective implementation of the transformation measures. In addition, government policies also give certain support and guidance to enterprises, creating a good external environment for the green transformation of enterprises.

The internal and external coordination and promotion path pays more attention to the coordination and cooperation of multiple forces. Green ability innovation of enterprises is still the core of the transformation, but it needs to cooperate closely with the government, employees, suppliers, customers and other multiple stakeholders to jointly form a joint force to promote the transformation. The support of leaders and employee participation provide a strong internal impetus for the transformation, while the government policy support provides a strong external guarantee for the transformation. This path emphasizes the balance and win-

win situation of the interests of all parties, and promotes the green transformation of traditional industries through synergies.

The collaborative driven path of market demand and employee participation highlights the core position of market demand and employee participation in the transformation. With the increasing awareness of consumer environmental protection and the continuous upgrading of market demand, green products have gradually become the mainstream choice of the market. In order to meet the market demand, enterprises must constantly improve their own green production capacity. At the same time, the active participation of employees is also an important force to promote the transformation. By making improvement suggestions and participating in environmental protection activities, they actively participate in the practice of green transformation. Enterprise green ability innovation, leadership support and government policy provide the necessary assistance and support for the transformation.

The government policy-leading path emphasizes the leading role of the government in the green transformation. The government actively guides enterprises to develop in the green direction by formulating relevant policies, providing financial subsidies, tax incentives and other incentive measures. In this path, the support of government policies has become the core driving force to promote the transformation, while the enterprise green ability innovation, leadership support, employee participation and other factors play an important supporting role. The government policy-led path is especially applicable to those enterprises with weak awareness or insufficient ability of green transformation. Through the guidance and support of the government, it helps them realize green transformation and promote the sustainable development of the industry.

② advised the government

In view of the leading path of enterprises, the government should further increase the policy incentives, through a series of policies and measures such as the provision of financial subsidies, tax incentives and loan interest discounts, effectively reduce the cost and risks of green transformation of enterprises, and enhance the enthusiasm and motivation of enterprise transformation. At the same time, the government should actively guide enterprises to increase investment in technology research and development, encourage enterprises to introduce advanced technology and equipment, improve their independent innovation ability, promote their green ability innovation, and form competitive advantages. In addition, the government should continue to optimize the business environment, simplify the approval process, improve service efficiency, create a more relaxed and favorable external environment for the green transformation of enterprises, fully support enterprises to become the subject and core of the green transformation, and promote enterprises to develop in a more environmentally friendly and sustainable direction.

In view of the internal and external collaborative promotion path, the government should give full play to the role of bridge and link, build a multi-party cooperation platform, promote the cooperation between the government, enterprises, employees, suppliers, customers and other multiple stakeholders, and jointly promote the green transformation of traditional industries. By formulating relevant coordination policies, we will encourage all parties to share resources and complement each other's strengths to form synergy. At the same time, the government should also strengthen the supervision and guidance of the green transformation process of enterprises, to ensure that the transformation meets the requirements of environmental protection and sustainable development, and to prevent enterprises from having short-sighted behavior or detours. Through the guidance and coordination of the government, all parties should actively participate in the transformation process and jointly promote the green upgrading of traditional industries.

In view of the collaborative driven path of market demand and employee participation, the government should cultivate green market demand through various channels and ways, improve consumers' awareness of environmental protection and green consumption concept, and promote green products to gradually become the mainstream of the market. At the same time, the government should also encourage employees to actively participate in the green transformation process of the enterprise, and stimulate the enthusiasm and creativity of employees by means of employee advice awards and environmental protection activities, so as to inject internal vitality into the green transformation of the enterprise. In addition, the government should also provide necessary policy support and financial support to help enterprises improve their green production capacity, meet the requirements of market demand upgrading, and achieve a win-win situation between economic development and environmental protection.

In view of the government policy-led path, the government should clarify the industrial development direction and goal of green transformation, formulate a detailed industrial development plan, and provide a clear path and guidance for the green transformation of traditional industries. At the same time, the government should also provide a series of industrial support policies, such as tax relief, financial subsidies, land concessions, etc., to reduce the cost of enterprise transformation and improve the enthusiasm of transformation. In addition, the government should also strengthen the training and introduction of talents, improve the introduction and training mechanism of talents, and increase the training and introduction of high-end technical personnel, research and development personnel and management personnel, so as to provide a strong talent guarantee for the green transformation. Through the leading and promotion of the government, promote the development of traditional industries to the green, high-end and intelligent direction, and realize the sustainable development of economy and society.

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