Industrial Internet Empowers Green Manufacturing: Policy Expression and Corporate Cognition

Lili Dou, Wu Chen*

Economics and Management School, Jiangxi Normal University, Nanchang 330022, China

*Corresponding author's e-mail: wchen@jxnu.edu.cn

Abstract. This article uses LDA topic model and Sentiment analysis to compare the policy text and enterprise comments in the field of industrial Internet and green manufacturing from 2015 to 2026, and reveal the matching characteristics of policy orientation and enterprise cognition. The study found that the relationship between the two sides presents a three-level structure of "collaboration-differentiation-difference": high coordination in the fields of "digital economy" and "industrial integration"; clear strategic consensus in the fields of "new quality productivity" and "green low-carbon" but differentiation of implementation paths; significant decline in the field of "equipment renewal" and "macro-governance". The strategy focuses on investment-driven and top-level design, and enterprises are concerned about cost recovery and specific tools. The enterprise as a whole has a positive attitude (emotional average 40.36/[-50,50]). Based on this suggestion: provide small and medium-sized enterprises with easy-to-deploy low-cost digital tools, improve the carbon accounting and cost-sharing mechanism, and transform macro policies into enterprise-executable operational guidelines to narrow the cognitive gap and promote deep integration.

Keywords: industrial Internet, green manufacturing, text mining, policy enterprise cognitive matching

1 Introduction

The integration of industrial Internet and green manufacturing is an important path to promote the transformation and upgrading of the manufacturing industry, and it is also a key support for the implementation of the "dual carbon" strategy. At present, China's industrial Internet empowers green manufacturing from pilot demonstration to large-scale promotion. Since the release of "Made in China 2025", the central government and relevant departments have issued plans and guidance to provide policy support for the integration of the two. The latest "Guidance on the Construction of Zero Carbon Plants" clearly proposes to promote the deep integration of industrial Internet and green low-carbon industries. However, is there a significant match difference between policy strategy deployment and enterprise practice response and how to solve it? This question has not been answered systematically. Studies and industry feedback show that despite the strong policy support, enterprises still generally face real challenges such as high

J. Rak et al. (eds.), *Proceedings of the 2026 11th International Conference on Social Sciences and Economic Development (ICSSED 2026)*, Advances in Economics, Business and Management Research 391,
https://doi.org/10.2991/978-94-6239-701-9_62

transformation costs, unclear technical paths, insufficient short-term benefits, and difficulties in mutual recognition of standards [1].

By the end of 2024, there will be more than 4.14 million 5G base stations nationwide, the industrial Internet identification analysis system has achieved full coverage of provinces, regions and cities, more than 450,000 enterprises have been served, and the number of identification registrations has exceeded 600 billion. The "5G + Industrial Internet" integration application pilot has been launched. However, the data on the enterprise side reveals an obvious gap: the digitalization rate of equipment is 50%, the networking rate of equipment is only 23%, remote monitoring is 24%, and predictive maintenance is 14%; at the level of system integration, 24% achieves preliminary integration, 19% has a complete integrated architecture, only 12% open up the whole process, and the equipment networking rate of small and medium-sized enterprises is common. Less than 50%. At the strategic level, 85% of enterprises put forward the vision of intelligent manufacturing, and 49% formulated development plans, showing a clear willingness to adopt the industrial Internet, but only 28% carried out evaluation and adjusted strategies in implementation, and the gap between vision and implementation is obvious. In the field of green manufacturing, the transformation cost of ammonia-hydrogen zero-carbon combustion is twice that of traditional technology. Due to the high initial investment, the willingness of enterprises to promote is sluggish, and the market recognition of green products still needs to be improved. On the whole, the policy infrastructure has formed a scale, but the progress of enterprise networking, integration and in-depth application is lagging behind, and the gap between the willingness to adopt and the implementation effect lies in the fact that the transformation cost, technology adaptation and short-term return expectations have not yet formed a virtuous cycle [2].

Regarding the industrial Internet and green manufacturing, the existing research mainly involves three aspects: first, explain the technical structure and development model of the two respectively [3]; second, explore the value of integrating the two to reduce emissions and increase efficiency [4]; and third, make a qualitative evaluation of a single policy text or policy tool. In terms of methods, most studies use qualitative discourse or case studies [5], and there are few quantitative comparative analysis based on long-term text data. From the perspective, existing research either focuses on policy supply or focuses on enterprise technology adoption behavior [6]. It is not common to integrate policy orientation and enterprise cognition into the same analysis framework and systematically examine the matching characteristics of the two. Therefore, existing research has confirmed the value of the industrial Internet to empower green manufacturing. However, based on the large-scale quantitative comparison of real feedback texts of enterprises, especially the disclosure of the details of the interaction between policy orientation and enterprise cognition The display is still relatively insufficient.

In summary, this article takes the national-level policy text and the enterprise public comment text from 2015 to 2026 as the object, and uses LDA topic model, word frequency analysis, semantic network analysis and Sentiment analysis and other methods to compare the consensus and differences between policy orientation and enterprise cognition on core issues [7], theme focus and emotional attitudes, in order to provide empirical reference for policy optimization and deep integration of the two.

2 Data Source and Research Method

2.1 Data Source

The time span of the corpus of this article is from March 31, 2015 to January 15, 2026. This period fully covers the critical stage of China's industrial Internet and green manufacturing from the rise of concepts, pilot exploration to large-scale promotion since the release of Made in China 2025. As of the time of analysis, the corpus contains a total of 9664 valid policy texts and 24768 valid enterprise comment texts. Based on this, this article takes the text comparison of "policy-enterprise" as the core research design, explores the intrinsic causes, and then puts forward targeted optimization suggestions.

2.2 Research Method

The policy text of this article comes from the official websites of the Chinese Government Network, the Ministry of Industry and Information Technology, the National Development and Reform Commission and so on; the text of the enterprise comment comes from the public discussion of enterprises in various industries in mainstream industry media, professional forums and financial information platforms. On this basis, the collected policy and enterprise text data are visualized and quantitatively analyzed, the LDA topic model and Sentiment analysis methods are comprehensively used to deeply explore the policy orientation and enterprise feedback, and the policy intention is compared and analyzed with the concerns and attitudes of the actual perception of the enterprise.

2.3 Data Preprocessing

In order to ensure the quality of the data, this article preprocesses the collected data: first, classify and clean the policy text and enterprise text, remove duplicate documents, noise data unrelated to the topic, and invalid symbols, expressions and text. Secondly, the word segmentation tool in KH Coder is used, and the disabled words are set, and the research data is removed from the disabled words and word segmentation processing. Finally, 9664 valid policy texts and 24768 valid enterprise comment texts are obtained.

2.4 LDA Theme Identification

Latent Dirichlet Allocation (LDA) is an unsupervised machine learning model used to automatically discover potential topics from a large number of documents. This article uses LDA to cluster the policy text, and determines the optimal number of topics (K=6) by calculating the degree of perplexity to identify the core topics of concern in the policy field.

2.5 Sentiment Analysis

Sentiment analysis aims to identify the subjective emotional tendencies contained in the text through the calculation model. With the help of the Sentiment analysis module of the micro-word cloud platform, this article calculates the emotional value of the enterprise comment text, so as to quantify the attitude of market entities towards the industrial Internet to empower green manufacturing.

3 Data Analysis Results

3.1 Word Frequency Statistics and Semantic Network Analysis

3.1.1 Word Frequency Analysis.

Word frequency analysis is a content analysis method to find the focus of the text and identify the core keywords. In policy and enterprise text analysis, the higher the frequency of a word, the higher the attention of the issue in policy deployment or enterprise discussion, and the more likely it is to become a key factor affecting the policy effect and enterprise practice. In order to visually show the focus and core themes of policies and enterprise texts in the field of industrial Internet and green manufacturing, use KH Coder to extract the top 40 words with the highest frequency after segmentation and cleaning(As shown in Table 1.), and use the micro-word cloud to draw a high-frequency word cloud. The size of the text in the figure intuitively corresponds to the words. The frequency of appearance is high or low(As shown in Figure 1.).

Table 1. Statistical table of high-frequency word.

Serial number	high-frequency characteristic word	frequency	Serial number	high-frequency characteristic word	frequency
1	promote	4387	21	encourage	735
2	innovation	4180	22	solution	696
3	support	3728	23	advantage	687
4	intelligent	3515	24	comprehensive	662
5	improve	2984	25	create	642
6	strengthen	2320	26	demonstration	629
7	energy	2031	27	expand	623
8	growth	1627	28	great	602
9	efficiency	1458	29	help	587
10	intelligence	1448	30	play	570
11	security	1394	31	risk	567
12	smart	1273	32	special	550
13	strong	1211	33	progress	522
14	advanced	1144	34	actively	511
15	demand	993	35	opportunity	496

Serial number	high-frequency characteristic word	frequency	Serial number	high-frequency characteristic word	frequency
16	increase	983	36	top	487
17	important	921	37	problem	471
18	talent	831	38	safety	434
19	optimize	802	39	boost	415
20	share	784	40	launch	414

Judging from the distribution of high-frequency words, policies and enterprise texts show a high degree of consistency at the lexical level, and jointly revolve around the promotion path of the industrial Internet to empower green manufacturing. The frequency of verbs such as "promote", "development" and "construction" is prominent, indicating that this field is in the whole chain construction stage from top-level design to implementation. The frequent appearance of subjective terms such as enterprise, industry, manufacturing, etc. highlights the main position of enterprises in the transformation and the integrity of industrial ecology. At the same time, core keywords such as "technology", "platform", "data" and "green" constitute the semantic mains, clarifying the technical connotation and key support of the transformation. In the policy text, guiding words such as "support", "encouragement" and "innovation", as well as normative terms such as "standard", "safety" and "collaboration" also account for a considerable proportion, reflecting the policy characteristics that attach equal importance to incentive guidance and system guarantee. On the whole, high-frequency words show a positive and constructive semantic tendency, reflecting that this field is highly valued at the policy and market levels, and is in the stage of comprehensive promotion.

Fig. 1. High-frequency word cloud.

3.1.2 Semantic Network Word Cloud.

The research uses the micro-word cloud platform to analyze the semantic network of pre-processed policies and enterprise texts. micro-word cloud is a mature online text

analysis and visualization tool, with functions such as word frequency statistics, semantic network construction and visual presentation, and is widely used in policy research, public opinion analysis and social network analysis [8].

Semantic network analysis can identify and measure the coexistence relationship between words. Among them, the thickness and sparseness of the inter-node connection represent the frequency and semantic association of words in the context. The denser the connection, the more frequent the simultaneous occurrence of words in the text, and the stronger the semantic association [9]. As shown in Figure 2, the semantic network of policy and enterprise text presents the core cluster - peripheral structure. The central area is composed of words such as "industry", "transformation", "manufacturing", "development", "innovation", "technology", "information" and so on. Chengqiang's related cluster reflects that the core issue of the industrial Internet empowering green manufacturing is to drive industrial transformation with technological innovation and achieve high-quality development of the manufacturing industry. These words constitute the core structure of the semantic network and reflect the strategic direction of policy formulation and enterprise practice. Words such as "production", "enterprises", "security", "industrial Internet platforms" and "equipment" are distributed in peripheral areas, forming a close connection with the core cluster, table Clear strategic orientation extends to the specific practical level. These words correspond to the production links, implementation subjects, infrastructure and guarantee conditions involved in the implementation of the transformation.

As a key digital infrastructure for green manufacturing, the role of the industrial Internet is to systematically optimize the production link through the integration of technology and industry. The connection between "technology-information" and "production-equipment" in the semantic network shows that the industrial Internet system characterized by data penetration and intelligent decision-making can support production process monitoring, energy management and equipment coordination. And reduce material consumption and emissions. The connection of "industry-manufacturing" and "enterprises-platforms" shows that the transformation path needs to be combined with the characteristics of the industry and the reality of the enterprise, and rely on the platform ecology to achieve differentiated promotion. On the whole, the semantic structure presents the transmission logic from the strategic framework to the practical elements: with industrial transformation as the goal, driven by technological innovation, through infrastructure such as platforms and equipment, it is implemented into the production link of the enterprise, forming a realization path of the industrial Internet to empower green manufacturing.

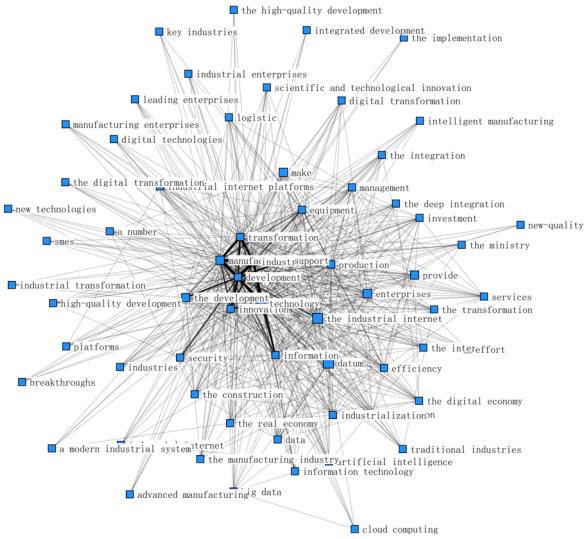

Fig. 2. Semantic network map.

3.2 Comment on the Extraction of Hot Topics

This paper uses the LDA topic model to cluster the policy text, and determines the optimal number of topics K by calculating the degree of perplexity. As the number of topics increases, the degree of perplexity gradually decreases, indicating that the model has a good learning effect. In order to avoid over-fitting, it is necessary to take into account the change trend of perplexity and the actual needs of the study when determining the K value. When the number of topics is greater than 6, the change rate of the perplexity curve tends to be flat, and combined with the theme clustering visualization results, it can be seen that when the number of themes is 6, the content distinction of each theme is better, so it is finally determined that K=6.

The LDA model divides the relevant words together according to the similarity of characteristic words and themes to express the corresponding themes [10]. Based on the results of LDA clustering and combined with the correlation characteristics between the core nodes in semantic network analysis, it is condensed into: new quality productivity, digital economy, industrial integration, equipment renewal, green low-carbon, and macro-governance. The analysis of each topic is shown in Table 2.

(1) New quality productivity. Judging from the characteristic words, words such as "high-quality development", "scientific and technological innovation", "subversive technology" and "industrial upgrading" are highly concentrated, which is the strategic direction of common concern between policies and enterprises. The policy text emphasizes the use of disruptive technology to promote industrial upgrading, while enterprise comments, while recognizing the value of technology, pay more attention to the industry adaptability and economic feasibility of technology, and look forward to differentiated and implementable solutions.

(2) Digital economy. The digital economic theme with "industrial Internet", "digitalization" and "data elements" as the core characteristics constitutes the underlying technical path of green manufacturing. The policy focuses on promoting the construction of infrastructure such as 5G+ industrial Internet and future factories. Enterprises generally look forward to digital empowerment, but the feedback points out that there are pain points such as data islands, inconsistent standards, and difficulty in value mining, and it is necessary to strengthen data governance and ecological support.

(3) Industrial integration. Its characteristic words are "integration and development", "integration of advanced manufacturing and modern service industry", "manufacturing cluster", "supply chain coordination", etc., focusing on releasing synergy value through model innovation. The policy puts it on platforms such as the free trade pilot zone for exploration, and enterprises provide many specific cases of reducing costs, increasing efficiency and reducing emissions through collaborative platforms, indicating that the policy in this field has a high degree of coordination with the market.

(4) Device update. Taking the "Action Plan" to vigorously promote "exchange the old for the new", "renewal" and "technological transformation" as the characteristic words, which is the direct grasp of the policy to promote energy conservation and carbon reduction. However, enterprise comments are related to concerns such as cost pressure and long investment return cycle, reflecting that there is an obvious temperature difference between macro incentives and micro constraints, and key obstacles need to be cleared through comprehensive incentives and services.

(5) Green and low-carbon. The theme covers "green development", "carbon peaking pilot", "carbon neutrality goal", "industrial energy conservation", "low-carbon industry", etc., which are the value goals of transformation. The policy system is relatively complete, but the feedback from enterprises focuses on operational challenges such as the inconsistence of carbon accounting standards and the difficulty of achieving green premiums, indicating the need to build a more refined measurement, market and consumption guidance system.

(6) Macro-governance. Characteristic words such as "macro-regulation", "coordinated planning", "stable growth", "demonstration area", etc., reflect the top-level design of the policy, but the relevant words are significantly marginalized in the discussion of enterprises. Enterprises pay more attention to specific tools such as taxes and financing, reflecting the signal decay of macro-policy intentions in the transmission to the market.

To sum up, the integration of digital economy and industry is the area with the highest degree of cognitive coordination between policies and enterprises; new quality productivity and green low-carbon have a clear consensus at the strategic level, but the implementation path still needs to be refined; equipment renewal and macro-governance show a significant cognitive gap, which is an urgent link in the current policy transmission.

Table 2. Classification and topic characteristic words.

Topic classification	Topic characteristic words
new quality productivity	high-quality development, artificial intelligence, local conditions, core competitiveness, Chinese-style modernization, disruptive technology, industrial upgrading, scientific and technological innovation

Topic classification	Topic characteristic words
digital economy	industrial Internet, digitalization, data center, data elements, intelligent network, digital empowerment, information and communication technology, future factory, 5G + industrial internet
industrial integration	integrated development, advanced manufacturing industry, integration of two industries, manufacturing cluster, free trade pilot zone, supply chain coordination, industrial chain extension, quality improvement and efficiency, value chain upgrading
equipment renewal	trade-in, technological transformation, action plan, recycling, renewal, advanced equipment, equipment renewal, effective investment
Green low-carbon	green development, green manufacturing, ecological civilization, carbon peak pilot, carbon neutrality target, low-carbon transformation, industrial energy conservation, green ecology, green high-quality development, low-carbon industry
macro-governance	demonstration area, total supply, low cost, macro policy, stable growth, planned indicators, macro-regulation, government work report, overall planning, employment priority, coordination

3.3 Sentiment Analysis of the Topic of the Comment Text

In order to evaluate the real attitude of market entities towards the industrial Internet to empower green manufacturing, the sentiment analysis of the enterprise's comment text is carried out with the help of the micro-word cloud platform, and the emotional value range is[-50,50]. The analysis results show that emotional average is 40.36, which is significantly higher than the neutral value, indicating that the enterprise as a whole has a positive supportive attitude (As shown in Figure 3.). The emotional distribution is concentrated in the 20-40 range, and only a few comments are between 0 and -10 points. There is no gathering of extremely negative emotions, reflecting that the feedback of the enterprise is mainly positive.

(1) Positive emotions mainly come from the following three aspects:

- Perception of technical results (representative words: ushering in, realistic, establishing, keen). Enterprises believe that the industrial Internet has moved from concept to practice, which can systematically reshape the production process and improve efficiency. For example, some comments point out that it is "changing China's manufacturing industry from concept to reality", and XCMG Group also mentioned that "production efficiency has been doubled and labor costs have been significantly reduced" after digital transformation.
- Ecological collaborative value (representative words: value, help, openness, vision). The platform transformation of the head enterprise and the collaborative case of the industrial chain have enhanced market confidence. For example, Foxconn (Industrial Fulian) is regarded as a typical example of "opening up the value of the whole industrial chain" and helping small and medium-sized enterprises build open infrastructure.

- Policy and market expectations (representative words: development, advantages, opportunities, support). Enterprises are optimistic about the continuous support of macro policies and market growth potential. For example, the CEO of General Electric once commented that "China's development of the industrial Internet has great advantages" and predicted that it may bring significant economic growth.

(2) Negative emotions mainly focus on the following three aspects:

- Uncertainty of financial returns (representative words: plummeting, unbearable, falling, loss). Some enterprises have expressed doubts about whether their transformation strategy can be transformed into sustainable profits. For example, the performance of the stock price after the listing of Industrial Fulian has raised questions about the substance of their business.
- Governance and social responsibility risks (representative words: employee problems, sweatshop, cheating, credit sweep). Internal management disputes, historical legacy issues or ethical scandals (such as Volkswagen's "emission gate") will seriously weaken the credibility of the enterprise's transformation narrative and affect the brand reputation.
- Competition and technical anxiety (representative words: increased competition, difficulty, leakage, risk). In the face of increasing competition in the industry, enterprises expressed concern about the lack of core technology, data security and long-term competitiveness.

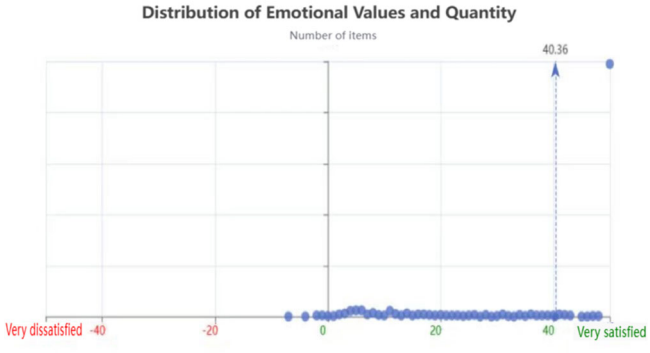

Fig. 3. Column chart of emotion score distribution.

4 Match Analysis of Policy Orientation and Enterprise Cognition

4.1 Cognitive Comparison at the Theme Level

In order to present the similarities and differences between policy orientation and enterprise cognition on various core themes, this article is based on the results of LDA

theme extraction and text analysis, and compares them in terms of focus, expression characteristics and market feedback, as shown in Table 3.

Table 3. Match analysis of policy orientation and enterprise cognition on the core theme.

Matching type	Core theme	Formation mechanism	Evidence anchor
Cognitive collaboration	digital economy industrial integration	Concretization of policy expressions (enterprises can benchmark and implement) + Verifiability of benefits (successful cases are replicable)	Quantified benefits of Foxconn and XCMG Group
Path differentiation	new quality productivity, green low-carbon	Uncertain technological pathways (core technologies rely on external supply) + Imbalance in cost attribution (the social benefits of emission reduction are borne by enterprises)	Domestic high-end industrial software rate < 15%; Profit margin of micro, small, and medium-sized enterprises is 3%—5%
Cognitive gap type	equipment renewal, macro-governance	Incentive misalignment (policies emphasize investment, enterprises focus on cost recovery) + Lack of intermediaries (policies target governments, lacking a translation link)	Platform reuse rate is 28%; Terms like "macro-control" are marginalized in enterprise comments

4.2 Analysis of the Cause Mechanism of Matching Differences

(1) Cognitive collaboration: digital economy and industrial integration. The concretization of policy expression and enterprise income can be verified, which constitutes the basis for highly coordinated incentive compatibility in this field. At the policy level, terms such as "5G + Industrial Internet", "Future Factory" and "Data Center" are clearly included in thematic features, transforming strategic advocacy into operational instructions that can be identified, benchmarked and declared by enterprises, which significantly reduces the decoding cost of enterprises' policy intentions. At the enterprise level, Foxconn, XCMG Group and other head cases have been repeatedly cited. Their quantifiable benefits such as "opening up the value of the whole industrial chain" and "doubling production efficiency and significantly reducing labor costs" provide the same industry with observable and replicable "adoption-benefit" evidence. This kind of

coordination is not the passive response of the enterprise to the policy discourse, but the initiative to transform the policy signal into the result of its own behavior expectations - when the policy design clearly conveys the signal directly related to the short-term interests of the target group, the enterprise will significantly reduce the interpretation cost and internalize the policy orientation. The concretization of policy signals and the verification of enterprise income together constitute the institutional conditions for incentive compatibility, so that the policy transmission in this field shows the characteristics of low loss.

(2) Path differentiation: new quality productivity and green low-carbon. The strategy is consistent, but the landing is blocked. Although the government and enterprises have the same goals in the direction of "new quality productivity" and "green low-carbon", there are differences in specific actions. In terms of new quality productivity, the government emphasizes "subversive technology" and "scientific and technological innovation" and pays attention to technological breakthroughs; enterprises are more concerned about "costs", "projects" and "applications", and are worried that core technologies are subject to people and market competition is intensified. At present, there is a lack of technical solutions suitable for small and medium-sized enterprises with low investment in the market. It is difficult for enterprises to try and make mistakes at low cost, and they cannot judge the return cycle. When the policy points to a long-term and uncertain technical direction and there is a lack of trial and error cost sharing and failure tolerance mechanism, enterprises often choose to wait and see to avoid losses. The differences in green and low-carbon aspects are due to the unequal cost and benefit: the government has built a complete policy framework from "dual carbon target" to "industrial energy conservation", but the positive evaluation of enterprises is mostly concentrated on "policy support" and "market opportunities", while the negative evaluation focuses on "unified carbon accounting standards" and "green products are not sold" The price is higher. "The investment in technical reform cannot be received in the short term". Due to the lack of unified accounting standards, it is difficult to quantify the emission reduction effect of enterprises; green products have no price advantage in the market, and emission reduction behavior cannot be converted into direct benefits. Enterprises bear the current cost of technological reform, but do not see the expected return - this is not the enterprise's disagreement with the dual-carbon target, but a rational choice that cannot be accounted under the current conditions [11].

(3) Cognitive gap type: equipment update and macro-governance. The policy document takes government departments as the expected readers, and fails to meet the cost recovery concerns of enterprises in equipment renewal and the operational information needs at the macro-governance level, which is the root cause of the cognitive gap. Specifically, in terms of equipment renewal, the policy positions it as a policy tool to promote investment and industrial upgrading, mainly using subsidies, tax incentives and other ways to encourage enterprises to participate; however, when enterprises consider equipment renewal, they pay attention to the micro-level finance such as equipment acquisition cost, investment recovery cycle and old equipment disposal. The problem is that the current incentive policy is insufficient to respond to the core issues of concern to enterprises. The decline at the macro-governance level is the preset deviation of the audience of the policy text. Words such as "macro-regulation", "coordinated planning"

and "stable growth" that appear frequently in the policy text are expressed as local governments and functional departments, which is a typical inter-government communication language; as the terminal receiver of the signal transmission chain, enterprises lack the operation of extracting project declaration conditions, preferential policy application standards and other operations. The translation channel of information. There is no significant co-relation between words such as "macro-regulation" and the high-frequency words "financing", "taxes" and "declaration" on the enterprise side, and the two types of discourse systems show low correlation. When the policy content is presented in the internal language of the government, and the translation intermediaries such as industry associations and professional institutions are absent, the policy signal decays step by step in the process of transmission, and the incentive intensity actually perceived by enterprises is significantly lower than the expectations of policymakers. This signal attenuation is not caused by the lack of decoding ability of enterprises. The root cause is the audience preset deviation that exists in the drafting stage of the policy text [12].

5 Conclusions and Suggestions

5.1 Conclusion

By comparing the policy text in the field of industrial Internet and green manufacturing from 2015 to 2026 with the enterprise comment text, this article reveals the three-level matching characteristics of "collaboration-differentiation-difference" between policy orientation and enterprise cognition. Among them, the cognitive in the fields of digital economy and industrial integration is highly coordinated, because the policy terms are concrete and the benefits of successful cases can be verified; the strategic consensus in the field of new quality productivity and green low-carbon is clear, but the implementation path is differentiated, which is due to the uncertainty of technological maturity and the lack of emission reduction cost recovery mechanism; equipment update, The significant decline in the field of macro-governance is directly related to the policy that the government is the preset reader and the enterprise lacks operational translation intermediaries. The above findings show that the effectiveness of policy transmission depends not only on the intensity of incentives, but also is closely related to the following two conditions: first, the clarity and operability of policy expression, and second, who bears the cost of transformation and how to share it. This analytical method can also be used to evaluate policy issues in other areas, such as digital governance and low-carbon transformation, which also require technical and institutional cooperation. At the same time, it is suggested that the actual demands of enterprises should be taken into account at the early stage of policy formulation.

5.2 Suggestions

Based on the previous analysis of the cause mechanism of the difference between policy orientation and enterprise cognitive matching, the following suggestions are put forward from the key shortcomings of path differentiation type and cognitive gap type.

(1) Build a public service platform for technology adaptation of small and medium-sized enterprises. Relying on the existing manufacturing innovation center, open online simulation and remote testing services for domestic industrial software and intelligent equipment for small and medium-sized enterprises; form a "small, fast, light and accurate" product list through solution collection, and pre-allocation of supporting funds to reduce the threshold of enterprise technology selection and early costs

(2) Improve the tax cost compensation policy for trial and error in research and development. It is clear that failed R&D projects can still enjoy additional deductions, eliminating the concern of enterprises that "fail, they cannot enjoy preferential treatment"; for science and technology-oriented small and medium-sized enterprises during the loss-making period, the loss amount formed by additional deduction is allowed to be carried over to the next year according to the regulations, so that the current R&D investment has the ability to deduct future tax burden.

(3) Establish a closed-loop system of carbon accounting-value realization-payment. Unify the carbon footprint accounting standards in steel, building materials, chemical industry and other industries, and link them with green product certification and government procurement bonus points; pilot to include certified carbon emission reduction in the intangible assets of enterprises as qualified pledges for green credit and carbon neutral bonds; promote the energy-saving guaranteed service fee payment mode: energy-saving service company undertakes After the acceptance meets the standard, the user will pay the service fee at one time or in installments. If it does not meet the standard, the service party shall bear the difference.

(4) Improve equipment renewal incentives from the three aspects of subsidy time, depreciation scope and old equipment transactions. Allow enterprises to independently choose the year of investment or to obtain subsidies according to energy saving year after production; explore the acceleration of depreciation to expand to value-added tax, and allow energy-saving and water-saving equipment to be depreciated flexibly according to the actual service life; rely on the national renewable resources information platform, promote "Internet + recycling" to establish an online valuation and transaction docking mechanism for old equipment.

Acknowledgments

This work was financially supported by the University Humanities and Social Sciences Research Project of Jiangxi Province, China (Grant No. GL23112).

References

1. Yun L, Li L, Zhang J, et al. Cost-effective industrial internet of things network planning for sustainable manufacturing systems. International Journal of Production Economics. 2025; 281: 109517. DOI:10.1016/j.ijpe.2025.109517.
2. China Academy of Industrial Internet. Report on the development of China's industrial internet industry economy (2024). Beijing, China: Tech. Rep.; 2024. Available from: https://www.china-aii.com/jgdt/7140705.jhtml..

3. Al-Khatib A W. The impact of industrial internet of things on sustainable performance: the indirect effect of supply chain visibility. Business Process Management Journal. 2023; 29(5): 1607-1629. DOI:10.1108/BPMJ-03-2023-0198.
4. Roy M, Jha M K, Chakrabarti A, et al. Green internet of things: a critical enabler for sustainable manufacturing. Environmental Progress & Sustainable Energy. 2025; 281: e70190. DOI:10.1002/ep.70190.
5. Ali A A, Mahmood A. Developing a causal framework of internet of things adoption barriers for agile manufacturing in post COVID-19. Journal of Manufacturing Technology Management. 2024; 35(1): 120-145. DOI:10.1177/18479790231223623.
6. Ghobakhloo M, Iranmanesh M. Digital transformation success under industry 4.0: a strategic guideline for manufacturing SMEs. Journal of Manufacturing Technology Management. 2021; 32(8): 1533-1556. https://doi.org/10.1108/JMTM-11-2020-0455.
7. Mao TT, Peng YH. Thematic hotspots and strategy analysis of international AI regulatory texts based on LDA models. Scientific Information Research. 2025;7(3):70-81. DOI:10.19809/j.cnki.kjqbyj.2025.03.007.
8. Kumar R, Sangwan K S, Herrmann C, et al. Cyber physical production system for smart manufacturing analytics and management: a systematic literature review, framework and roadmap. International Journal of Computer Integrated Manufacturing. 2025; 38(1): 1-31. DOI:10.1080/0951192X.2025.2563261.
9. Schöps J D, Jaufenthaler P. Semantic network analysis in consumer and marketing research: application areas in phygital contexts. Qualitative Market Research: An International Journal. 2024; 27(3): 495-514. DOI:10.1108/QMR-06-2023-0084.
10. Höllerer M, Jancsary D, Barberio V, et al. The interlinking theorization of management concepts: cohesion and semantic equivalence in management knowledge. Organization Studies. 2020; 41(9): 1284-1310. DOI:10.1177/0170840619856033.
11. Heikkila T, Gerlak A K, Smith B. Diagnosing individual barriers to collective learning: how governance contexts shape cognitive biases. Journal of European Public Policy. 2024; 31(7): 2026-2049. DOI:10.1080/13501763.2023.2251525.
12. He A J, Zhu L, Qian J. Policy design and policy feedback in welfare retrenchment: a survey experiment in China. Policy Studies Journal. 2025; 53(2): 307-327. DOI:10.1111/psj.12569.