Quantitative Research on the Policy Text of China's New Generation Artificial Intelligence from the Perspective of Policy Tools

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Abstract. With the application and promotion of artificial intelligence technology in China, the necessity of systematic research on the new generation of artificial intelligence policies is prominent. This study focuses on the use of policy tools in the new generation of artificial intelligence policies in China in the new era. Combining quantitative analysis methods of policy texts, it explores the distribution and framework structure of existing policy tools, providing reference for subsequent policy formulation and implementation. Based on the analytical framework of "supply demand environment" policy tools built by Rothwell&Zegveld, this study adopts the Content analysis method to build a two-dimensional analytical framework of X dimension (policy tools) and Y dimension (policy objectives), and collates 418 policy analysis items. This study found that the current generation of artificial intelligence policy tools is still imbalanced and uncoordinated, with fewer supply oriented policy tools and an increasing focus on the construction of innovative industries; The application of demand based policy tools focuses on the construction of pilot zones, but lacks top-level design; The use of environmental policy tools is too frequent, and the proportion of internal tools needs to be adjusted. It is urgent to improve the effectiveness of policy implementation and strengthen the integrity of policy combinations while following the laws of policy evolution.

Keywords: Policy tools; New generation artificial intelligence; Policy text; Quantitative research.

1. Introduction

In July 2017, the State Council of China issued a notice titled "On the Development Plan for the New Generation Artificial Intelligence," emphasizing the need to "accelerate the deep integration of artificial intelligence with the economy, society, and national defense as the main focus, and to enhance the innovation capacity of the new generation of artificial intelligence technology as the main direction of attack." In September 2021, the National Governance Committee for the New Generation Artificial Intelligence released the "Ethical Norms for the New Generation Artificial Intelligence," emphasizing the importance of actively learning and popularizing ethical knowledge related to artificial intelligence, objectively understanding ethical issues, and not underestimating or exaggerating ethical risks. It also calls for active engagement in discussions on ethical issues related to artificial intelligence and the promotion of ethical governance practices, in order to enhance the ability to address these issues. Currently, China's policies on the new generation of artificial intelligence are showing a positive trend of comprehensive development, progressive deepening, and orderly advancement. On one hand, from a practical perspective, the new generation artificial intelligence industry has made significant breakthroughs and developments under policy-driven initiatives, demonstrating trends towards chipization, hardwareization, and platformization. On the other hand, from a theoretical perspective, research on relevant technological innovation and policy studies has increased significantly since 2017, becoming a new focus, engine, and opportunity for national development.

In terms of research on the new generation of artificial intelligence, the related achievements mainly revolve around themes such as "intelligent manufacturing," "people's government," "digital economy," and "high-quality development." Firstly, regarding "intelligent manufacturing," research has explored topics such as high-end equipment intelligent manufacturing projects and the intelligent upgrading of new energy equipment manufacturing companies, starting from the background of the new generation information technology environment (Yang Shanlin et al., 2023; Meng Fansheng et

al., 2022). Secondly, in terms of the intelligentization of the "people's government," research has examined the impact of artificial intelligence on government work from a regional comparative perspective, using the "policy attribute-policy structure" framework (Dan Xiaohong et al., 2021). Thirdly, in relation to the "digital economy," artificial intelligence promotes economic development through the "activation effect" on related industries, and facilitates the "technology for good" aspect of artificial intelligence (Guo Chaoxian, Fang Ao, 2021). Lastly, in terms of "high-quality development," scholars have discussed the Solow paradox in the promotion of the use of artificial intelligence, and have separately examined the short-term and long-term effects of the new generation of artificial intelligence on labor productivity (Cheng Wen, 2021). Additionally, the governance policies for artificial intelligence exhibit characteristics of "decentralization" and "opacity" (Chen Shaowei, Wu Jianxia, 2022), often embedded within other policy texts. The new generation of artificial intelligence is "efficiency-oriented," and its substantive issues are analyzed from the perspectives of "political origins" and "policy origins" (Hu Chong, Jiang Chaoxin, 2022). Empirical analysis of relevant policies in the United States shows that the U.S. approach to artificial intelligence policy exhibits characteristics driven by both "power games" and "security competition" (Zhu Rongsheng, Chen Qi, 2022).

As for the methodology of this study, the importance of quantitative analysis of policy texts is highlighted. With the increasing computability of policy texts, the quantitative analysis of policies has rapidly developed under the influence of computer science and technology. Policy analysis emphasizes statistical, non-precise, and interdisciplinary approaches. Furthermore, in the process of quantitative analysis of policy texts, the stages of "text acquisition," "text processing," and "text analysis" are interrelated (Cao Lingjing, Zhang Zhiqiang, 2023). Moreover, as a new research paradigm, quantitative analysis of policy texts has developed new connotations, research scopes, and methods, and has established a complete research process from sample extraction to coding, processing, and verification. The main method types at the current stage include "policy quantification analysis," "content analysis," and "effect word analysis" (Zheng Xinman, Dong Yu, 2021).

This study mainly refers to the research literature of Rothwell & Zegveld and builds a systematic policy tool analysis framework based on it, starting from the perspectives of supply-oriented, demand-oriented, and environmental-oriented approaches. In the analysis phase, this study adopts content analysis to construct a two-dimensional analytical framework consisting of the X dimension (policy tools) and the Y dimension (policy objectives), compiling a total of 418 policy analysis items. The study finds that the current policy tools for the new generation of artificial intelligence are not well-balanced, with a shortage of supply-oriented policy tools and an excessive use of environmental-oriented policy tools. The study suggests that attention should be paid to strengthening top-level design, optimizing the proportion of internal tools, enhancing the effectiveness of policy implementation, following the laws of policy evolution, and improving the quality of overall policy combinations.

2. Literature Review

2.1 The New Generation of Artificial Intelligence

Distinguished from previous discussions on artificial intelligence, the new generation of artificial intelligence focuses more on "single-domain" or "multi-domain" strong artificial intelligence, utilizing "mathematical language" or "computer language" to formalize "natural language" (Li Deyi, 2020). As early as the 1950s, the concept of "artificial intelligence" was first proposed at an academic conference held by Dartmouth College in the United States. However, the field experienced a rapid decline in the late 1960s. In the 1980s, artificial intelligence resurged, but Japan's claim of the "Fifth Generation Computer" ended in failure. In 2016, AlphaGo, based on artificial intelligence technology, defeated the Korean Go master Lee Sedol with a score of 4:1, once again bringing the new generation of artificial intelligence to the forefront of history. This technology is considered capable of imitating

human beings and amplifying human thinking through the means of data, becoming the spiritual nourishment of technology (Huang Xinrong, 2019).

As the technology continues to mature, artificial intelligence can play its instrumental role, liberating humans from tedious labor and even integrating with the human brain, forming a "cloud brain era" with entirely new rules. However, at the same time, it may also bring risks and challenges. At the individual level, it may lead to direct substitution of workers and the entanglement of human will by intelligent technology. At the societal level, it may result in weak social relationships and polarization of social groups (Zhang Jinsong, Wu Hongzhen, 2021). In the process of embedding the new generation of artificial intelligence into grassroots governance, there are multiple ethical dilemmas, including "privacy ethics" and "algorithm ethics," as well as issues such as the "digital access divide" and "digital usage divide" (Hao Yuqing, Wang Haijian, 2021). Artificial intelligence is permeating all aspects of people's lives and production methods. While creating new opportunities for traditional human production modes and social order, it also poses new challenges.

2.2 Policy Tools

Research on policy instruments in Western academia began in the 1980s. With the continuous maturation of related fields, the study of public policy with policy instruments as the core has gradually expanded (Zhu Chunkui, 2011). There is no unified definition of policy instruments in the academic community, but scholars mainly explain different aspects of policy instruments from the following three perspectives. First, the realization mechanism of government actions. Owen E. Hughes interprets policy instruments as "the regulatory mechanism through which government institutions achieve government actions through certain means and approaches" (Owen E. Hughes, 2015: 95-105). Some scholars describe it as "the path and mechanism through which the government transforms its substantive goals into concrete actions" (Zhang Chengfu & Dang Xiuyun, 2007: 14). Second, the means for implementing government policies. Douglas C. North believes that policy instruments link goals and outcomes and are means implemented to achieve public policy goals. Howlett and Ramesh view policy instruments as "the actual methods and means that the government possesses when deploying and implementing policies" (Howlett and Ramesh, 2006: 5). Hood proposes that policy instruments are various governance means used by the government to govern public affairs. Third, the activities for achieving policy objectives. B. Guy Peters and Frans K.M. Van view policy instruments as both a goal and an activity. They are "a collection of policy activities that share similar characteristics and focus on the impact and governance of social processes" (Guy & Frans, 2007: 14). Gu Jian-guang et al. regard policy instruments as actions taken in the process of decision-making or practice (Gu Jian-guang, Wu Minghua, 2007: 47-51). These three perspectives can present different aspects of policy instruments in different contexts, complementing each other.

Due to the differences in research objectives, policy instruments have been classified according to different criteria, resulting in various classification methods such as binary classification, ternary classification, and quaternary classification. The earliest classification was made by E.S. Kirschen, who categorized policy instruments into 64 types, but lacked explanations of the specific characteristics and systematic classification of different policy instruments (Wang Shiqiang, 2012, pp. 78-83). Lester M. Salamon classified policy instruments into expenditure instruments and non-expenditure instruments based on government spending conditions (Chen Zhenming, 2004). Lorraine M. McDonnell and Richard F. Elmore divided policy instruments into command, incentive, capacity-building, and system change types (Huang Honghua, 2010). Howlett and Ramesh classified policy instruments into voluntary, mandatory, and hybrid types based on the degree of government involvement. Hybrid policy instruments lie between policy-oriented and mandatory instruments in terms of government involvement. Rothwell and Zegveld categorized policy instruments into supply-oriented, demand-oriented, and environmental-oriented types based on the different impacts caused by policy instruments, which can be used to determine the direction of policy texts. This study will analyze based on the three categories proposed by Rothwell and Zegveld. This classification method has been widely used by domestic and foreign scholars and has good explanatory power. In terms of

domestic research on policy instruments, Chen Zhenming classified policy instruments into market-oriented tools, business management techniques, and social means. Zhang Chengfu believed that policy instruments include government-provided services, services provided by other institutions commissioned by the government, franchise rights, and government sales of specific services, based on the degree of government intervention (Zhang Chengfu, 2008). Gu Jian-guang classified policy instruments into regulatory, incentive, and information transmission categories based on their usage by the government (Gu Jian-guang, 2017).

3. Research Design

3.1 Analytical Framework for Policy Analysis of the New Generation of Artificial Intelligence

The data sources for this study: This article retrieved keywords such as "new generation artificial intelligence" through the Peking University Law Treasure database, while also searching electronic government platforms such as the Chinese government website and conducting a full-text search of policy texts. The inclusion criteria for policy texts in this study are as follows: (1) Authority and normativity. This study mainly selects policy documents publicly released at the central level (currently in effect), as well as administrative policies and departmental regulations, including notices, decisions, and opinions, among others; (2) Relevance and timeliness. This study considers that the search results should be closely related to the new generation of artificial intelligence, focusing on selecting new generation artificial intelligence policies released since the 18th National Congress of the Communist Party of China, from 2012 to 2023. Based on the above criteria, duplicate results were eliminated, resulting in a total of 32 retrieved policy texts.

Table 1. Summary of China's New Generation Artificial Intelligence Policies

No.	Policy Name	Issuing Department	Date of Issuance
1	Notice of the State Council on the Issuance of the Development Plan for the New Generation Artificial Intelligence	State Council General Office	2017
2	Ethical Norms for the New Generation Artificial Intelligence	Ministry of Science and Technology	2021
3	Notice of the Ministry of Science and Technology on the Issuance of the Guidelines for the Construction of National New Generation Artificial Intelligence Innovation and Development Pilot Zones (Revised Edition)	Ministry of Science and Technology	2020
4	Notice of the National Standardization Management Committee, the Cyberspace Administration of China, the National Development and Reform Commission, and other departments on the Issuance of the Guidelines for the Construction of the National New Generation Artificial Intelligence Standard System	National Standardization Management Committee, Cyberspace Administration of China, National Development and Reform Commission, Ministry of Science and Technology, Ministry of Industry and Information Technology	2020
…	...	...	...
29	Letter from the Ministry of Science and Technology on Supporting the Construction of the National New Generation Artificial Intelligence Innovation and Development Pilot Zone in Shanghai	Ministry of Science and Technology	2019
30	Letter from the Ministry of Science and Technology on Supporting the Construction of the National New Generation Artificial Intelligence Innovation and Development Pilot Zone in Beijing	Ministry of Science and Technology	2019
31	Notice of the General Office of the Ministry of Industry and Information Technology on the Issuance of the Work Plan for the Key Tasks of Innovation in the New Generation Artificial Intelligence Industry	General Office of the Ministry of Industry and Information Technology	2018
32	Notice of the Ministry of Science and Technology on the Release of the Guidelines for the Application of the Major Project "New Generation Artificial Intelligence" in the Science and Technology Innovation 2030 Program in 2018	Ministry of Science and Technology	2018

The policy analysis framework constructed in this study analyzes the new generation artificial intelligence policies from the perspective of policy instruments. It deconstructs the policies through the following two aspects: on one hand, it needs to determine the implementation objectives of the selected new generation artificial intelligence policy samples; on the other hand, it needs to consider the impact of new generation artificial intelligence policies on policy objectives. Based on the above criteria, this article constructs a two-dimensional analysis framework for new generation artificial intelligence policies from the dimensions of policy objectives and policy instruments.

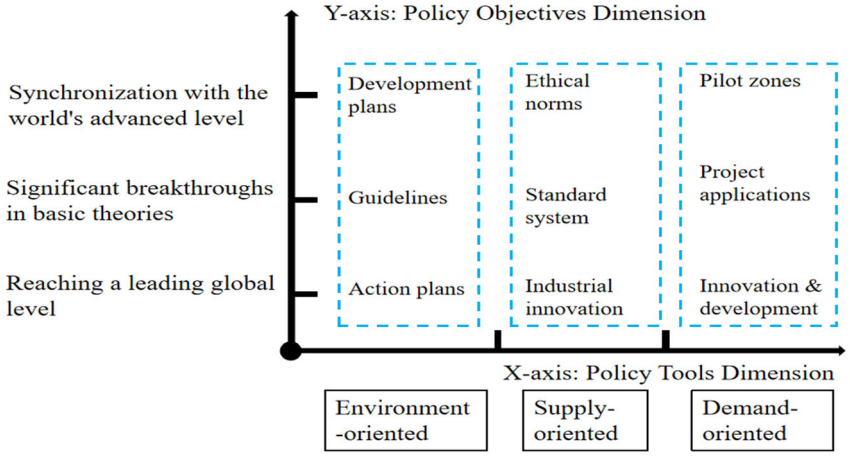

Figure 1. Policy Analysis Framework

3.2 X-axis: Policy Tools Dimension

In light of the fundamental characteristics of policies concerning the new generation of artificial intelligence, this study draws on the policy tool classification method proposed by Rothwell and Zegveld to analyze the policies related to the new generation of artificial intelligence issued by national ministries and commissions. The text analysis units are matched with different policy tools. The specific dimensions of policy tools are presented in the table below.

Table 2. Connotations of Policy Tools

Basic Policy Tools	Specific Policy Tools	Connotations
Supply-oriented	Ethical norms Standard system Industrial innovation	Ethical norms for the new generation of artificial intelligence Guidelines for the construction of the national new generation artificial intelligence standard system Key tasks for the innovation of the new generation artificial intelligence industry
Demand-oriented	Pilot zones Project applications Innovation and development	Guidelines for the construction of national new generation artificial intelligence innovation and development pilot zones Annual project application guidelines for major projects in the field of "new generation artificial intelligence"
Environment-oriented	Development plans Guidelines Action plans	Notice of the State Council on the issuance of the development plan for the new generation of artificial intelligence Guidelines for the construction of national new generation artificial intelligence innovation and development pilot zones Three-year action plan to promote the development of the new generation artificial intelligence industry

3.3 Y-axis: Policy Objectives Dimension

Policy objectives provide the basis for policy implementation, and the establishment of specific objectives lays the foundation for policy implementation. According to the "Development Plan for the New Generation of Artificial Intelligence" issued by the State Council, this study categorizes

policy objectives into three steps based on chronological order: firstly, by 2020, overall technology and applications should be synchronized with the world's advanced level; secondly, by 2025, significant breakthroughs should be achieved in basic theories; thirdly, by 2030, theories, technologies, and applications should reach a leading global level. Considering the content of the texts, this study sets the dimensions of policy objectives as synchronization with the world's advanced level, significant breakthroughs in basic theories, and reaching a leading global level. The specific connotations are presented in the table below.

Table 3. Dimensions and Connotations of Policy Objectives

Policy Objectives	Connotations	Specific Objectives	Specific Connotations
Synchronization with the world's advanced level	Theory and technology	Significant progress in the theory and technology of the new generation of artificial intelligence	By 2020, overall technology and applications of artificial intelligence should be synchronized with the world's advanced level. The artificial intelligence industry should become a new important economic growth driver, and the application of artificial intelligence technology should provide new ways to improve people's livelihoods, effectively supporting the goal of becoming an innovative country and achieving a moderately prosperous society.
	Competitiveness of the industry	The competitiveness of the artificial intelligence industry enters the international forefront	
	Development environment	The development environment for artificial intelligence further optimizes	
Significant breakthroughs in basic theories	Theory and technology system	The preliminary establishment of the theory and technology system of the new generation of artificial intelligence	By 2025, significant breakthroughs should be achieved in the basic theories of artificial intelligence, and some technologies and applications should reach a leading global level. Artificial intelligence should become the main driving force for upgrading industries and transforming the economy, and positive progress should be made in the construction of an intelligent society.
	Industry and global value chain	The artificial intelligence industry enters the high-end of the global value chain	
	Legal regulations, ethical norms, and policy system	The preliminary establishment of legal regulations, ethical norms, and policy system for artificial intelligence	
Reaching a leading global level	Mature theory and technology system	The formation of a mature theory and technology system for the new generation of artificial intelligence	By 2030, theories, technologies, and applications of artificial intelligence should reach a leading global level. It should become a major global center for artificial intelligence innovation, and significant achievements should be made in the intelligent economy and intelligent society, laying an important foundation for becoming a leading innovative country and an economic powerhouse.
	Competitiveness level of the industry	The competitiveness of the artificial intelligence industry reaches the international leading level	
	Science and technology innovation and talent development bases	The formation of a group of globally leading artificial intelligence science and technology innovation and talent development bases	

4. Selection and Coding of Policy Texts

4.1 Selection of Analytical Objects

This study primarily sources policy texts from national ministries and commissions. Firstly, the Peking University Law Information Retrieval Software is used to search for keywords such as "new generation artificial intelligence" or "artificial intelligence," and the time span of policy texts is set from 2012 to 2023. Additional texts are obtained from government websites based on the search results, resulting in a total of 32 texts (as shown in Table 1). Based on the issuing authorities and the number of documents, this study finds that the policies related to the new generation of artificial intelligence are mainly issued and implemented by organizations such as the National Standardization Management Committee, the Cyberspace Administration of China, the National Development and Reform Commission, the Ministry of Science and Technology, and the Ministry of Industry and Information Technology. Most of these policies serve the policy objectives outlined in the "Notice of the State Council on the Issuance of the Development Plan for the New Generation of Artificial Intelligence" released in July 2017.

4.2 Content Coding

Following a multidimensional research framework, policy tools are coded to analyze and categorize them systematically. The policy tool types, specific policy tools, and policy objectives are assigned numerical codes for targeted statistical analysis. The coding scheme is as follows:

Table 4. Coding Scheme for Policy Tools and Objectives

Category	Code
Policy Tool Types	1=Supply-oriented tools, 2=Demand-oriented tools, 3=Environment-oriented tools
Specific Policy Tools	Supply-oriented tools: 1=Ethical norms, 2=Standard system, 3=Industrial innovation Demand-oriented tools: 1=Pilot zones, 2=Project applications, 3=Innovation and development Environment-oriented tools: 1=Development plans, 2=Guidelines, 3=Action plans
Policy Objectives	1=Synchronization with the world's advanced level, 2=Significant breakthroughs in basic theories, 3=Reaching a leading global level

This study employs a coding system that includes the "policy code - specific sections/clauses - policy content - policy tool type - specific policy tool - policy objective" to analyze and summarize the policy texts. The coding results are then classified and analyzed based on the dimensions of policy tools and policy objectives.

5. Research Findings

In this section, a word frequency analysis is conducted using Nvivo11 PLUS software with a minimum word length set to 4. This analysis helps identify the occurrence of different policy tools and objectives in the policy texts. The word frequency analysis reveals that keywords such as "artificial intelligence," "pilot cities," "people's government," "basic theories," "government agencies," and "operating systems" appear frequently in the policy texts, with a count of 10 or more. Additionally, keywords like "computing centers," "small and medium-sized enterprises," and "developed countries" also appear multiple times. Further analysis will employ a combination of one-dimensional and two-dimensional methods to explore the patterns of policy tools and objectives in the policy texts. This study will summarize the characteristics of policy tool usage through progressive analysis and provide targeted policy recommendations.

Table 5. Word Frequency Analysis of Policy Texts (Count N≥10)

Word	Length	Count	Weighted Percentage
Artificial intelligence	4	1742	3.55
Pilot cities	5	26	0.05
People's government	4	22	0.04
Basic theories	4	20	0.04
Government agencies	4	10	0.02
Operating systems	4	10	0.02
Computing centers	4	8	0.02
Small and medium-sized enterprises	4	5	0.01
Developed countries	4	4	0.01

5.1 One-dimensional Analysis of Policy Tools

The statistical analysis reveals an imbalance in the use of policy tools for the new generation of artificial intelligence. The proportions of supply-oriented, demand-oriented, and environment-oriented policy tools are 21.34% (83/417), 36.93% (191/417), and 41.73% (144/417), respectively. Among the environment-oriented policy tools, guidelines (19.90%) are the most frequently used, while action plans (7.19%) are the least used.

Table 6. Distribution of Basic Policy Tools (n=418)

Basic Policy Tools	Specific Policy Tools	Connotations	Percentage
Supply-oriented	Ethical norms Standard system Industrial innovation	Ethical norms for the new generation of artificial intelligence Guidelines for the construction of the national new generation artificial intelligence standard system Key tasks for the innovation of the new generation artificial intelligence industry	21.34% (89/417)
Demand-oriented	Pilot zones Project applications Innovation and development	Guidelines for the construction of national new generation artificial intelligence innovation and development pilot zones Annual project application guidelines for major projects in the field of "new generation artificial intelligence"	36.93% (154/417)
Environment-oriented	Development plans Guidelines Action plans	Notice of the State Council on the issuance of the development plan for the new generation of artificial intelligence Guidelines for the construction of national new generation artificial intelligence innovation and development pilot zones Three-year action plan to promote the development of the new generation artificial intelligence industry	41.73% (174/417)

Supply-oriented policy tools have the lowest frequency of usage, with the standard system (8.87%) being the most frequently used and industrial innovation (5.76%) being the least used. Demand-oriented policy tools are used more frequently, with pilot zones (21.82%) having a significantly higher proportion than other tools, while innovation and development (9.33%) are the least used. Please refer to the table above for details.

5.2 Two-dimensional Analysis of Policy Tools and Policy Objectives

This study utilizes Nvivo software to comprehensively analyze the distribution of the three basic policy tools in different policy objective areas in the X dimension and Y dimension. The results show an uneven distribution of the three policy tools across different policy objectives. The environment-oriented policy tools correspond to the highest number of policy objectives and have a relatively large proportion. The supply-oriented policy tools have a smaller total number but exhibit significant variations, mainly focusing on policy objectives such as "significant breakthroughs in basic theories" and "establishment of artificial intelligence legal regulations, ethical norms, and policy systems." The demand-oriented policy tools show more noticeable variations, particularly in the field of "synchronization with the world's advanced level." This indicates that China's new generation artificial intelligence policies primarily focus on creating a favorable development environment and promoting the achievement of the policy objective of "synchronization with the world's advanced level."

Table 7. Two-Dimensional Analysis of Policy Tools and Objectives

	Reaching a leading global level	Industry competitiveness reaching a leading level	Mature theory and technology system	Science and technology innovation and talent development	Significant breakthroughs in basic theories	Establishment of artificial intelligence legal regulations, ethical norms, and policy systems	Entering the high-end of the global value chain	Preliminary establishment of theory and technology system	Synchronization with the world's advanced level	Further optimization of development environment	Competitiveness entering the international forefront	Significant progress in theory and technology
1: Supply-oriented tools	17	8	8	1	16	12	1	5	10	4	2	5
2: Standard system	8	1	7	0	6	4	0	2	4	1	1	3
3: Industrial innovation	5	5	0	0	3	1	1	1	4	1	1	2
4: Ethical norms	4	2	1	1	8	8	0	2	3	2	1	0
5: Environment-oriented tools	33	10	15	9	27	20	2	6	26	13	1	12
6: Development plans	21	3	11	8	7	3	1	3	6	4	0	2
7: Guidelines	12	7	2	3	13	11	1	2	16	7	1	8
8: Action plans	3	0	3	0	8	6	0	2	4	2	0	2
9: Demand-oriented tools	14	8	4	5	16	14	1	2	45	29	1	15
10: Innovation and development	9	5	4	2	2	2	1	0	7	5	0	2
11: Pilot zones	3	3	0	1	5	3	0	2	37	24	1	12
12: Project applications	3	1	0	2	10	10	0	0	2	1	0	1

Table 8. Two-Dimensional Analysis of Policy Tools and Objectives (Row Distribution)

	Reaching a leading global level	Industry competitiveness reaching a leading level	Mature theory and technology system	Science and technology innovation and talent development	Significant breakthroughs in basic theories	Establishment of artificial intelligence legal regulations, ethical norms, and policy systems	Entering the high-end of the global value chain	Preliminary establishment of theory and technology system	Synchronization with the world's advanced level	Further optimization of development environment	Competitiveness entering the international forefront	Significant progress in theory and technology
1: Supply-oriented tools	14.8%	27.15%	7.88%	1.33%	18.05%	12.99%	23.61%	33.62%	11.43%	8.53%	22.38%	13.88%
2: Standard system	10.61%	18.03%	6.99%	0%	10.26%	2.81%	0%	25.4%	6.94%	0.95%	11.82%	12.65%
3: Industrial innovation	1.84%	4.79%	0%	0%	0.74%	0.22%	23.61%	0.45%	1.74%	1.67%	9.21%	1.23%
4: Ethical norms	2.35%	4.33%	0.9%	1.33%	7.56%	10.69%	0%	7.77%	2.76%	5.91%	1.35%	0%
5: Environment-oriented tools	25.49%	10.74%	30.05%	37.51%	9.86%	6.91%	23.71%	13.9%	12.58%	14.05%	9.8%	11.25%
6: Development plans	15.69%	2.73%	22.53%	20.04%	3.35%	0.8%	7.4%	8.12%	4.1%	6.52%	0%	2.17%
7: Guidelines	7.25%	8.01%	2.16%	19.17%	3.49%	3.67%	16.31%	1.83%	7.24%	6.72%	9.8%	7.4%
8: Action plans	3.13%	0%	5.95%	0%	3.21%	2.45%	0%	4.54%	1.23%	0.81%	0%	1.67%
9: Demand-oriented tools	9.36%	11.93%	11.77%	10.31%	21.7%	29.68%	2.68%	2.19%	25.93%	27.27%	17.82%	24.87%
10: Innovation and development	7.69%	8.51%	11.77%	3.09%	0.3%	0.42%	2.68%	0%	5.37%	7.97%	0%	3.35%
11: Pilot zones	1.32%	3.42%	0%	4.98%	1.38%	0.94%	0%	2.19%	19.49%	17.91%	17.82%	20.68%
12: Project applications	0.49%	0.35%	0%	2.24%	20.11%	28.44%	0%	0%	1.2%	1.68%	0%	0.83%

Table 9. Two-Dimensional Analysis of Policy Tools and Objectives (Column Distribution)

	Reaching a leading global level	Industry competitiveness reaching a leading level	Mature theory and technology system	Science and technology innovation and talent development	Significant breakthroughs in basic theories	Establishment of artificial intelligence legal regulations, ethical norms, and policy systems	Entering the high-end of the global value chain	Preliminary establishment of theory and technology system	Synchronization with the world's advanced level	Further optimization of development environment	Competitiveness entering the international forefront	Significant progress in theory and technology
1: Supply-oriented tools	14.8%	27.15%	7.88%	1.33%	18.05%	12.99%	23.61%	33.62%	11.43%	8.53%	22.38%	13.88%
2: Standard system	10.61%	18.03%	6.99%	0%	10.26%	2.81%	0%	25.4%	6.94%	0.95%	11.82%	12.65%
3: Industrial innovation	1.84%	4.79%	0%	0%	0.74%	0.22%	23.61%	0.45%	1.74%	1.67%	9.21%	1.23%
4: Ethical norms	2.35%	4.33%	0.9%	1.33%	7.56%	10.69%	0%	7.77%	2.76%	5.91%	1.35%	0%
5: Environment-oriented tools	25.49%	10.74%	30.05%	37.51%	9.86%	6.91%	23.71%	13.9%	12.58%	14.05%	9.8%	11.25%
6: Development plans	15.69%	2.73%	22.53%	20.04%	3.35%	0.8%	7.4%	8.12%	4.1%	6.52%	0%	2.17%
7: Guidelines	7.25%	8.01%	2.16%	19.17%	3.49%	3.67%	16.31%	1.83%	7.24%	6.72%	9.8%	7.4%
8: Action plans	3.13%	0%	5.95%	0%	3.21%	2.45%	0%	4.54%	1.23%	0.81%	0%	1.67%
9: Demand-oriented tools	9.36%	11.93%	11.77%	10.31%	21.7%	29.68%	2.68%	2.19%	25.93%	27.27%	17.82%	24.87%
10: Innovation and development	7.69%	8.51%	11.77%	3.09%	0.3%	0.42%	2.68%	0%	5.37%	7.97%	0%	3.35%
11: Pilot zones	1.32%	3.42%	0%	4.98%	1.38%	0.94%	0%	2.19%	19.49%	17.91%	17.82%	20.68%
12: Project applications	0.49%	0.35%	0%	2.24%	20.11%	28.44%	0%	0%	1.2%	1.68%	0%	0.83%

Overall, the 417 policy items cover various subjects and aspects of the new generation of artificial intelligence. The content involves areas such as "reaching a leading global level," "significant breakthroughs in basic theories," "establishment of artificial intelligence legal regulations, ethical norms, and policy systems," "synchronization with the world's advanced level," and "further optimization of development environment." This indicates that China's main goals in the field of new generation artificial intelligence are to break through the technological limitations imposed by Western countries and achieve the policy objectives of "reaching a leading global level" and "synchronization with the world's advanced level." In terms of issuing authorities, the National Standardization Management Committee, the Cyberspace Administration of China, the National Development and Reform Commission, the Ministry of Science and Technology, and the Ministry of Industry and Information Technology have concentrated their efforts in releasing relevant policies, providing significant policy impetus for the development of the new generation artificial intelligence industry.

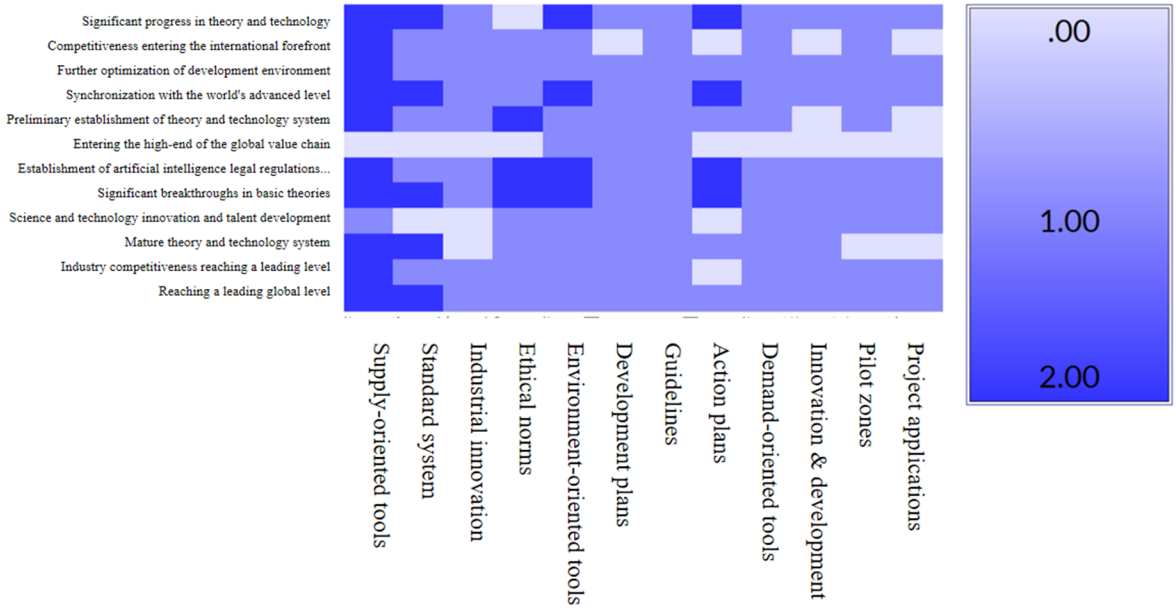

Figure 2. Matrix Coding Results

6. Conclusion and Recommendations

6.1 Research Conclusions

Conclusion 1: Supply-oriented policy instruments pay insufficient attention to standard systems and ethical norms, with limited focus on innovative industries.

Current policies on the new generation of artificial intelligence primarily concentrate on standard systems and ethical norms, which is closely related to the "policy objectives" outlined in the "Notice on the Development Plan for the New Generation of Artificial Intelligence" issued by the State Council in July 2017. In the United States' artificial intelligence strategy, the country promotes rapid iteration of artificial intelligence through a comprehensive government approach, reconstructing the cognitive logic of development models (Xie Gang, Chi Zhongjun, 2023). In China, in response to the ongoing controversies surrounding standards and ethical issues related to artificial intelligence, the government has accelerated the formulation of corresponding policies and laws to guide and regulate the existing problems. This study finds that the current supply-oriented policy instruments adopted in the new generation of artificial intelligence policies often focus superficially on the development of innovative industries, providing macro-level guidance for industry layout and development, but lacking proactive measures at the specific field level, particularly in terms of promoting the systematic development of the industry and policies related to talent system cultivation.

Conclusion 2: Environmental policy instruments primarily focus on work guidelines, with limited attention to action plans.

As the technology in the field of the new generation of artificial intelligence is still in its early stages of development, the frequent use of environmental policy instruments by the government aims to create a favorable environment for the development of the new generation of artificial intelligence, particularly in terms of breaking barriers and fostering a collaborative environment. However, most of these instruments remain at the level of work guidelines, lacking in both top-level design and more specific action plans. This is particularly evident in policies aimed at achieving technological development, talent cultivation, and enhancing industrial competitiveness to a leading level. For example, looking at the 40-year development history of China's manufacturing industry, it is currently facing an unprecedented trend towards intelligence (Li Lianshui et al., 2019). In the new generation of artificial intelligence policies, there is a lack of mandatory policy instruments, with a greater emphasis on instruments that play a guiding role. This phenomenon indicates that China's intervention in the development of the new generation of artificial intelligence is relatively limited, and the country holds a cautious and inclusive attitude towards emerging artificial intelligence industries. However, supply-oriented instruments can still be used to promote the standardized development of the new generation of artificial intelligence industries and facilitate industry progress.

Conclusion 3: Demand-oriented policy instruments are excessively focused on pilot zone construction, with limited attention to innovation development and project applications.

This study finds that the current demand-oriented policy instruments in the new generation of artificial intelligence policies are primarily applied to pilot zone construction, playing a significant role in creating exemplary models and forming regional artificial intelligence ecosystems. Additionally, previous research suggests that the increasing emphasis on international cooperation can be observed through the lens of demand-oriented policy instruments in the new generation of artificial intelligence policies (Yuan Ye et al., 2021). However, despite the benefits of concentrated regional resource allocation through pilot zone construction, there is a lack of specific guidance in terms of innovation development and the application of key industrial projects. Without strong policy support, resources are not effectively concentrated, and the development of pilot zones may be constrained by other factors.

6.2 Policy Recommendations

Recommendation 1: Promote the effectiveness of supply-oriented policy instruments in the field of innovative industries.

Supply-oriented policy instruments should be given sufficient attention, and various types of instruments should be balanced in their implementation. As the new generation of artificial intelligence continues to expand in terms of technology and applications, it becomes increasingly important to guide industry development through proactive policy measures. According to the academic perspective of Justin Yifu Lin, the role of policies is greater than that of the market in the early stages of the development of emerging industries (Lin Yifu, Gong Qiang, 2010). The analytical conclusions of this study indicate that the government's policy layout for the development of the new generation of artificial intelligence should align with the basic path of supply-side reform and conform to the laws of development in emerging technology industries. The use of sub-category policy instruments should also focus on key areas in line with the development stages of industries and technologies.

Recommendation 2: Enhance the guidance of environmental policy instruments through actionable plans in practical implementation.

The use of policy instruments should be aligned with different stages of industrial development and have a tangible impact on practical implementation. Regarding environmental policy instruments, unnecessary input of production resources should be gradually reduced, and the influence of environmental policy instruments on actual industrial development should be further enhanced to improve the efficiency of public services. In the new stage of historical development, more

comprehensive and sound policy support should be applied to enhance the flexibility of industrial development and further promote the autonomy of market regulation. Additionally, in the context of the development of new generation artificial intelligence policies, market demand should be guided and encouraged to foster a positive development trend in the new generation artificial intelligence industry.

Recommendation 3: Guide the application of demand-oriented policy instruments beyond pilot zone construction.

Demand-oriented policy instruments should be practical and capable of producing effects beyond pilot zone construction, demonstrating their effectiveness after policy implementation. There is a certain time lag between the implementation and issuance of policies, and the effectiveness of policies is influenced by this time delay. The new generation of artificial intelligence policies is a strategic technology that can lead the future, and enhancing the operability of policies can promote the development of the artificial intelligence industry. For example, in terms of legal regulations and ethical issues that may arise from artificial intelligence, monitoring the implementation of different types of policy instruments should be strengthened to avoid ineffective outcomes due to insufficient funding. A comprehensive approach should be taken to promote the positive role of the new generation of artificial intelligence policies in industrial development.

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