Research on the impact and improvement path of artificial intelligence on government regulation efficiency

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Abstract: *With the deep integration of intelligent technology and government management scenarios, the management functions of modern government have also undergone changes, and artificial intelligence has gradually penetrated into the modernization process of government management. Artificial intelligence not only accelerates the transformation and innovation of government management models, but also impacts government regulation, triggers information security risks, and brings legal and ethical issues to the government. The article will analyze from four aspects: achieving intelligent control, strengthening joint governance, conducting credit supervision, and accelerating regulatory mechanism reform, providing a basis for the government to choose a path to improve regulatory efficiency in the intelligent era.*

Keywords: *Artificial Intelligence; Government Regulation; Upgrade Path*

1. Current situation of artificial intelligence development in China

1.1 Artificial intelligence and cognitive development

In the 1950s, research on artificial intelligence (AI) emerged. At present, artificial intelligence has been integrated into more and more applications such as unmanned driving, autonomous decision-making, and human-computer interaction. Since the 21st century, most developed countries have regarded the development of artificial intelligence as a major strategy for maintaining national security and mastering scientific and technological dominance.

1.2 The development status of China's artificial intelligence industry

1.2.1 Industrial structure

The AI industry structure in China is divided into basic layer, technical layer, and application layer. The basic layer mainly involves breakthroughs in core technologies of cloud computing, standardization, standardization of data resources and data center construction, chip development, and other aspects. Technology application research mainly involves: computer vision, speech recognition, natural language processing, etc. The application layer is specifically manifested in fields such as smart healthcare, autonomous driving, and intelligent manufacturing.

1.2.2 Industrial scale

The demand for artificial intelligence covers a wide range of industries. Although affected by the epidemic and economic downturn, the scale of China's AI core industry continues to grow. In recent years, the number of newly registered AI related enterprises has been increasing year by year. In 2022, the number of AI related enterprises in China has exceeded 1.09 million.

1.2.3 Standard development

The "Guidelines for the Construction of the National New Generation Artificial Intelligence Standard System" provides a detailed description of the development of standard systems in the AI field in promoting industry management norms and technical standardization. The specific work is coordinated and planned by the Artificial Intelligence Standardization Overall Group, with the

Standardization Technical Committee and various sub technical committees in charge, participating in the formulation and release of various technical standards[1].

2. The impact of artificial intelligence on the efficiency of government regulation

From traditional government regulation to digital government regulation supported by artificial intelligence and big data, there have been changes in regulatory subjects, scope boundaries, work dimensions, work characteristics, and dependency paths, As shown in Table 1:

Table 1: Changes in the government regulatory mode

Type/Characteristics	Regulatory entity	Scope boundary	Work dimension	Job characteristics	Path Dependency
Traditional regulatory model	Clear regulatory body (basic integration of legal authorization and enforcement bodies)	Clear hierarchy Clear boundaries	Pre approval post punishment Segmentation	Administrative, authoritative, mandatory, unidirectional	Institutional dependence, human dependence
Digitalization regulatory model	Diversified regulatory entities (significant intermediary role of regulatory platforms)	Unclear boundaries intersections	Real time monitoring and timely warning Indirectness and convenience	Indirectness convenience Equilibrium interactivity	Platform Dependency Technical dependence

Artificial intelligence is gradually penetrating into the process of government management, contributing to the improvement of government management efficiency on the one hand, and impacting the effectiveness of government regulation on the other hand, resulting in the risk of data information leakage and violation of legal ethics.

2.1 The impact of artificial intelligence on the transformation and innovation of government management models

The current era is no longer about whether to accept artificial intelligence, but about how to apply it for the benefit of humanity. Artificial intelligence has been involved in various fields of people's production, life, and public services, such as intelligent medical diagnosis, facial recognition, intelligent robots, intelligent detection of road vehicles, and unmanned taxis.

2.1.1 Artificial intelligence provides support for optimizing government governance efficiency

The main reasons for the low efficiency of government governance under traditional administrative models are: low personnel quality, insufficient abilities, and low enthusiasm. Artificial intelligence can provide support for optimizing the efficiency of government governance. The integration of artificial intelligence into government governance can overcome the problems of government governance under administrative mode and use artificial intelligence to perform routine tasks such as document processing. Relevant research data shows that efficiency can be improved by at least 20%.

2.1.2 Artificial intelligence provides support for deepening the depth, breadth, and validity of government decision-making

The scientific decision-making of the government cannot be separated from the collection, analysis, and calculation of big data. Artificial intelligence utilizes the advantages of data analysis and deep and scientific decision-making to scientifically analyze and process a large amount of data, providing digital support for government decision-making in advance, during, and after the event, including risk warning, problem analysis, etc., promoting the refinement of government management and scientific decision-making.

2.1.3 Artificial intelligence provides support for improving the effectiveness of government public services

The communication between the government and the public can be achieved through official platforms or complaint hotlines, as well as proactive visits from the public. However, artificial intelligence can be embedded in government public service processes with its own technological advantages. Solve social problems by addressing public service challenges. For example, using artificial intelligence to improve government service processes, measures, and methods.

2.2 Artificial intelligence affects government regulatory efficiency

At present, artificial intelligence can replace some government functions. The relevant functions of the government in regulatory efficiency, such as property registration and intellectual property rights, are challenged in the development and application of new digital technologies. The continuous development of artificial intelligence technology will result in some government functions being replaced by emerging technology solutions and emerging technology enterprise institutions.

2.3 Artificial intelligence poses data security risks

2.3.1 Impact of artificial intelligence on information security

In order to prevent the risk of government management information being exploited by illegal elements and prevent the decryption of management keys, the data and information security challenges brought by artificial intelligence bring significant pressure to the government's technical management. How to avoid the threat of information leakage to information security is the primary research topic.

2.3.2 Personal safety risks caused by artificial intelligence

The digitization of life traces can provide strong data support for the government to make scientific decisions in the information age. However, the pain point is that the personal information of technology users is recorded online, which poses a security risk to citizens' privacy. It can be seen from this. It is particularly important to supervise the legality and legitimacy of the government's comprehensive collection, use, and storage of data.

2.4 Artificial intelligence brings legal and ethical issues

The infringement of personal privacy of the public means that in the process of government management, the role of digital technology in widely collecting, analyzing and processing personal data information of the public through public power to improve the efficiency of government decision-making has not been well handled. At the same time, it also brings corresponding risks to the public and individuals.

3. Integrating with artificial intelligence is an inevitable choice for modern government regulation

With the application of artificial intelligence and big data in various industries, artificial intelligence also provides important means for the fulfillment of government functions and the implementation of government regulation. Modern government governance cannot do without the support of artificial intelligence and big data. Its specific manifestations mainly include:

3.1 Integrating with artificial intelligence is a way for the modernization of government regulation

The complexity of the current government regulatory situation and the diversification of government regulatory content make it inevitable to innovate and upgrade regulatory methods and tools. In order to build a smart government, the recording and analysis functions of artificial intelligence and big data can be utilized to digitize the management of regulatory items, providing real-time feedback on various market data. Through multi-source regulatory data, a reliable platform and raw materials can be provided for intelligent prediction and deep machine learning. With the flexible application of big data analysis technology and new regulatory methods, precise data in various industry fields can be formed, Regulatory needs can be perceived at any time, enabling precise warning and risk assessment.

3.2 Integrating with artificial intelligence is a way to improve the efficiency of government regulation

With the deep development of government informatization, there have been new perspectives and ideas in the construction of a rule of law government, such as transparency of the entire process and visualization of results. The exchange, statistics, and disclosure of information and data are more convenient, and technological rationality reduces the risk of manual supervision delaying various departments and related business processes[2]. By relying on regulatory platforms at all levels to obtain sufficient monitoring information for corresponding supervision and law enforcement, achieving bi-directional supervision of problem objectives can effectively improve the efficiency of government regulation.

4. Path selection for improving government regulation efficiency in the intelligent era

4.1 The necessity of government regulation in the intelligent era

From the perspective of modern national governance, government authority achieves market and social governance through the integration of resources by the government. Government governance is achieved through the provision of public service products and the resolution of social problems. Market management is the establishment of economic order through price and competition mechanisms. Social management refers to the maintenance of social order by individuals or organizations through resource mechanisms and autonomous and self-discipline mechanisms. These levels cooperate with each other in structure and complement each other in functionality.

4.2 Government regulation enables intelligent control

With the continuous development of digital technology, government regulation is gradually shifting from linear control to intelligent control. The abundant and high-quality data lays the foundation for the development of artificial intelligence computing capabilities and algorithms in the era of digital government. The government can use artificial intelligence to improve intelligent management and decision-making systems. The limitations caused by data resources in areas under traditional government supervision result in low efficiency in resource optimization and weak resource supply capacity, making it impossible to achieve refined supervision in areas such as public services and social management. By mining and analyzing a large amount of data through intelligent networking systems, regulatory information can be highly shared, ultimately achieving intelligent government regulation. The government regulation achieved through artificial intelligence technology is mainly based on algorithms and comprehensively utilizes intelligent technology to achieve deep radiation of government regulation effects. At the same time, with regulatory informatization as the core, we focus on intelligent risk warning and control. The main manifestations of the transformation of government regulation towards intelligence driven by artificial intelligence technology are as follows:

4.2.1 Establish an intelligent supervision system for independent analysis

The development of artificial intelligence relies on a large amount of rich data and deep machine learning, and has the ability to recognize, learn, reflect, and optimize oneself. The above characteristics of artificial intelligence development can enable it to have a thinking mode similar to human consciousness when facing different periods and types of data, to analyze and supervise objects, and form an intelligent supervision system for independent analysis.

4.2.2 Automatic reading and analysis of government supervision system

To facilitate automatic reading and analysis by the government supervision system, it is necessary to convert the speech and behavior of the supervised object into machine readable language. Artificial intelligence can complete the above transformations through the use of big data and knowledge graphs, and perform systematic automatic reading and analysis.

4.2.3 Transforming regulatory data into a form of government regulation

How can different regulatory data provide reference for government regulation through statistics and analysis? Artificial intelligence can use methods such as perception, learning, and computation to transform different regulatory data into government regulated and meaningful representations.

4.2.4 Analysis of intelligent combination algorithms

The artificial intelligence combination algorithm utilizes the data filtering and analysis functions of artificial intelligence to identify and mine the relationships and patterns between different types of data from massive amounts of data, providing comprehensive data and decision-making basis for government regulation.

4.3 Government regulation to achieve joint governance

In order to comply with the requirements of the fourth industrial revolution and the Digital transformation, artificial intelligence technology gives full play to the characteristics of high mobility and strong penetration, and makes technical contributions in medical, financial, police, education, transportation and other industries. However, in terms of government regulation, due to the hierarchical relationship of the organizational structure, it is difficult to achieve synergy between the government and different entities. Difficulties in exercising government functions, slow transmission of regulatory information, and inability to share have arisen. The integration of new technologies is a technological factor in the emergence of artificial intelligence government regulatory products. Achieving joint governance is an excellent way to achieve good governance and an inevitable requirement for multi-agent cooperation. At present, the cultural environment of government collaborative supervision has gradually formed. The synergy theory suggests that any complex system, under the influence of external energy or when the aggregation state of materials reaches a certain critical value, different factors among subsystems will gather together and interact with each other in a nonlinear manner, resulting in great synergy[3] .Improving government regulation and achieving joint governance with the support of artificial intelligence have shown a good development trend.

4.4 Government regulation to achieve credit regulation

In previous government regulatory methods, the regulatory approach was relatively vague. Currently, by fully utilizing new generation information technologies such as big data and artificial intelligence, specific regulations can be further implemented, such as credit supervision. Credit supervision can not only obtain credit records of social members through data platforms, but also link multiple industries to form personal credit files through unified data collection and analysis. By comparing credit supervision data, tracking processes, and monitoring issues. In addition to implementing credit supervision through government regulation, it is also necessary to establish a credit supervision system through the functions of data screening, analysis, and integration of artificial intelligence. In the environment of collaborative supervision by multiple entities, with the improvement of the social credit supervision system and the promotion of government digital reform, it is an inevitable path for government supervision to develop the means of government supervision from previous fuzzy supervision to current credit supervision in the context of artificial intelligence.

4.5 Realizing the reform of government regulatory mechanisms

Digital regulation requires early consideration of how to better utilize intelligent regulation technology to improve regulatory efficiency, balance precise and fair government regulation, and ensure the synchronous and healthy development of government regulation and digital reform, supported by big data and artificial intelligence technology[4]. Realizing the reform of government regulatory mechanisms can not only improve institutional loopholes in government regulation from the perspective of management norms, but also eliminate potential risks of information leakage from the aspects of data information quality and information security management.

4.5.1 Establish and improve data information quality supervision mechanism

Data quality plays a crucial role in the accuracy of regulation and the effectiveness of services, and digital regulation requires the collection, analysis, and utilization of massive amounts of data. Collecting authentic, objective, and high-quality data provides basic information for achieving scientific government regulation. To prevent potential regulatory risks caused by errors and omissions, supervision should be implemented to screen the authenticity and quality of the data, in order to prevent weak government regulation caused by data from endangering the credibility and legitimacy of the government.

4.5.2 Establish and improve data information security supervision mechanism

The construction of a comprehensive information security guarantee mechanism can improve the regulatory mechanism for data information security. A comprehensive information security guarantee

mechanism can be established from aspects such as network security, data security, personal information security, etc., and technical and behavioral governance of information security can be carried out around the requirements and goals of controllable security. This includes encrypting data related to government regulation, establishing an integrated security protection system, establishing data security assessments for government regulation, and standardizing security management regulations for government regulation data, in order to achieve the goal of ensuring the security of government regulation systems and data. In terms of data classification and grading, a security system is implemented through data screening and security system screening. The digital security processing capability can be realized by ensuring the security and controllability of hardware and software, and strengthening drills and training. By monitoring data information security, the hidden dangers of network leakage can be improved. By building a scientific network information security system and a standardized management system as the starting point, the regulatory security and leakage accountability mechanism can be improved.

4.5.3 Establish a comprehensive and comprehensive regulatory mechanism

A comprehensive, scientific and effective regulatory system is the guarantee for the effective performance of government regulation. The digitization of government operations cannot be separated from the analysis of big data and the simulation of artificial intelligence decision-making. Accurate and effective government regulation requires comprehensive development of artificial intelligence support technology. In order to build a systematic and comprehensive supervision system that reflects the operation of government regulatory functions, it is necessary to comprehensively integrate government functions such as coordinated economic regulation, market regulation, social management, ecological monitoring, and public services, integrate and comprehensively utilize information from various parts, and implement comprehensive and systematic strict supervision[5]. The government's digital intelligent supervision under the application of artificial intelligence technology can establish a comprehensive regulatory mechanism by coordinating the monitoring objects, subjects, and behaviors.

4.5.4 Improving government legal and management rules for regulation

Although the system has always been in a process of change and cannot achieve a long-term perfect state, the significance of rule design is still enormous. In the constantly changing internal and external environment, especially in the current situation where artificial intelligence is highly applied to government governance, we continuously improve the government's legal system and management rules, so that a clear rule framework can better avoid regulatory failures, and enable the government to deeply influence the implementation of government functions under modern technology. There is a deeper institutional consideration for the improvement of government regulation and management. The main role of the government is to establish institutional rules and maintain them. Strong institutional guarantees can effectively achieve the transformation of government regulation from passive governance to proactive response. Innovative government management and online and offline work mechanisms can ensure the interconnection, effective communication, and participation of government regulation. Strengthen and improve relevant laws and regulations, establish corresponding standards and norms, and ensure overall coordination, intelligence, efficiency, and smooth and orderly operation of government digital supervision [6]. In order to avoid information leakage caused by the intervention of artificial intelligence and big data in government regulation, eliminate information security risks, and continuously improve regulatory functions and management rules, it is an inevitable choice to strengthen the protection system of information security and the accountability system for information leakage, comply with the needs of digital government regulation, and fully leverage the role of artificial intelligence technology and big data platforms in government regulation.

In summary, artificial intelligence has emerged as a major strategy for maintaining national security and mastering scientific and technological dominance in various industries. At present, artificial intelligence has penetrated into the operation and management of public organizations. In the modernization process of government regulation, it not only plays a role in accelerating the transformation and innovation of government management models, but also impacts the conventional management of government regulation, causing security risks of information leakage, and bringing legal and ethical issues to the government. After analysis, it is proposed that efforts can be made to achieve intelligent control, strengthen joint governance, carry out credit supervision, and accelerate regulatory mechanism reform, providing a basis for the selection of paths for the government to improve regulatory efficiency in the intelligent era, and providing reference for the scientific application of artificial intelligence technology and big data platforms to comprehensively enhance the effectiveness of government regulatory functions.

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