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Research on the Role of New Quality Productivity in Reshaping the Theoretical Framework of Public Management in the Era of Artificial Intelligence and Big Data

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Abstract: In the context of the rapid development of artificial intelligence (AI) and big data technology, new quality productivity is profoundly affecting the theory and practice of public management. Based on the in-depth analysis of the characteristics of new qualitative productivity driven by AI and big data, this paper discusses the process of reshaping public management theory. The study points out that the new quality productivity has endowed public management with new characteristics of data-driven, intelligent decision-making, collaborative governance and precise service, and proposes a theoretical framework of public management to adapt to this transformation. The main conclusions of this study include that AI and big data are profoundly reshaping traditional public management theories, data-driven and intelligent decision-making have become the core pillars, and collaborative governance and precise services constitute the mainstream mode of public management in the new era. In terms of theoretical contributions, this study not only constructs a new framework of public management theory that adapts to the new quality of productivity, but also enriches the relevant management theory system. In terms of practical implications, the study suggests that the government should formulate technology and data governance policies and strengthen the deep integration of technology and social systems to optimize public services and governance effects. Although this study has limitations in terms of sample coverage and time span, it provides a direction for further discussion of international comparison and technology ethics in the future. Through theoretical analysis and practical guidance, this study aims to help public management achieve high-quality development in the era of new quality productivity.

Keywords: Artificial Intelligence; Big Data; New Quality Productivity; Public Management; Collaborative Governance.

1. Introduction

1.1. Research Background and Questions

1.1.1. Artificial Intelligence (AI) and New Qualitative Productivity Characteristics Driven by Big Data

As the technological revolution continues to advance, artificial intelligence (AI) and big data are shaping the core characteristics of new qualitative productivity. The key to new productivity is that data has become the core factor of production, and algorithms, computing power and intelligent systems constitute an important driving force for productivity improvement. AI has significantly enhanced data processing and decision-making capabilities through technologies such as deep learning and natural language processing. Big data provides new possibilities for productivity creation through the collection, storage, analysis and mining of massive information.

With the support of the new qualitative productive forces, profound changes have taken place in economic and social activities. The mode of production has shifted from material-based manufacturing to data-based intelligent service industry as the core, the workflow has shifted from manual control to intelligence and automation, and social management has also entered the stage of data-driven precision governance. This leap in productivity has not only changed the production mode of enterprises, but also put forward new requirements for the management practices of the public sector, especially in the allocation of resources, policy formulation and the provision of public services.

1.1.2. Challenges and Opportunities for Public Administration in the New Era

In the context of the new era, public management is faced with a complex and changeable external environment. On the one hand, the rapid changes brought about by the technological revolution have made the traditional theory and practice of public management face the challenge of insufficient adaptability. On the other hand, public expectations for service efficiency, policy precision and participation have increased significantly, which has put forward higher requirements for the governance capacity of the public sector.

Traditional public management theories take bureaucracy and new public management as the core logic, which is characterized by emphasizing hierarchical management and performance appraisal, but it is too rigid and lagging behind in responding to social changes driven by AI and big data. For example, the traditional management model is often difficult to adapt to the needs of real-time data update and dynamic adjustment of decision-making, and it is also difficult to efficiently handle the complex demands of multiple stakeholders. At the same time, the widespread application of

emerging technologies provides unprecedented opportunities for public administration. AI algorithms can assist in policy decision-making, big data analysis can optimize resource allocation, and blockchain technology can improve the transparency of public services. The empowerment of these new technologies makes public management have great potential in achieving intelligence, science and precision.

1.2. Implications of the Study

1.2.1. Theoretical Significance: Promote the Dynamic Update of Public Management Theory

At present, public management theory is relatively lagging behind in responding to the rapidly changing technological environment. The rise of new qualitative productivity provides new perspectives and tools for reconstructing public management theory. This study attempts to explore the role of AI and big data in reshaping the theoretical framework of public management by analyzing the characteristics of new qualitative productivity driven by AI and big data, so as to promote the transformation of public management theory from a static framework to a dynamic adaptation model, and inject new vitality into the theoretical system.

The theoretical significance is reflected in two aspects: first, it injects the connotation of new quality productivity into the traditional theory, and proposes a management model that adapts to the intelligent era; The second is to explore the governance logic of data-driven and algorithm-participatory, so as to provide a multidisciplinary research basis for public management theory. This not only enriches the theoretical system of public administration, but also provides enlightenment for research in other fields.

1.2.2. Practical Significance: Optimize Public Decision-Making and Service Models

At the practical level, the new qualitative productivity brings new tools and approaches to the public sector. By studying how AI and big data empower public management, it can provide a scientific basis for government decision-making, public resource allocation and service model optimization. For example, through data analysis technology, the government can more accurately grasp the needs of the public, so as to design more personalized and precise public policies. Through AI technology, the public sector can improve the speed and efficiency of emergency response, such as the rapid deployment and effective operation of health code systems and epidemic prevention resource scheduling platforms during the epidemic.

In addition, AI and big data also provide the possibility to build a collaborative governance model. The participation of multiple stakeholders in traditional public management is often constrained by the problems of information asymmetry and high cost of collaboration, but intelligent technology can reduce these costs and enhance the interaction efficiency between the government, society and enterprises. It is of great practical significance to study how to apply these technologies to practical management scenarios to improve the efficiency of public governance.

1.3. Research Objectives and Methods

1.3.1. Explore the Impact of New Qualitative Productivity on the Theoretical Framework of Public Management

The core objective of this research is to analyze how AI and big data-driven new qualitative productivity affect the theoretical framework of public management. Specifically, this study will explore the mechanism of new qualitative productivity in data-driven decision-making, algorithm-supported governance, and stakeholder collaborative participation, and reveal its innovative significance to traditional public management theories. By sorting out the process of reshaping the production relations and management methods of the new quality productive forces, the far-reaching impact of the new quality productivity on the theoretical level is analyzed.

1.3.2. Propose a New Theoretical Framework for Public Management in the Era of AI and Big Data

On the basis of exploring the impact of new qualitative productivity on the theoretical framework of public management, this study will construct a new theoretical framework of public management that adapts to the era of AI and big data. The framework will integrate the core logic of data-driven, algorithm-supported and collaborative governance, and propose a path for public management to transform from a traditional model with hierarchical control as the core to an intelligent and collaborative one. The goal of the new framework is to provide theoretical guidance for public management practice through dynamic adaptation and intelligent analysis, and to provide a reference for government departments to implement effective management in the context of rapid technological iteration.

2. Literature Review

2.1. The Impact of Artificial Intelligence and Big Data on Productivity Theory

2.1.1. The Traditional Connotation of the Marxist Theory of Productive Forces

The Marxist theory of productive forces holds that productive forces are the fundamental driving force for the development of human society, and are composed of three major elements: laborers, labor tools, and labor objects. In traditional industrial societies, the tools of labor are dominated by mechanized equipment, and the relations of production are based on economic activities based on material materials. Marx pointed out that science and technology are revolutionary elements of the productive forces, which promote the transformation of the mode of production, and thus change the relations of production. This theory provides a profound historical perspective on how the modern technological revolution has shaped productivity.

However, the traditional productivity theory mainly focuses on the transformation process of material resources and mechanical tools, and less on information resources and their position in the productive forces. With the advancement of technology, especially the rapid development of information technology, data has gradually surfaced as a new factor of production, which has had a profound impact on production tools and forms of labor. This provides a new dimension to the modern expansion of the theory of productivity.

2.1.2. Characteristics and Research Progress of New Qualitative Productivity Empowered by AI and Big Data

The new qualitative productivity driven by AI and big data presents the following core characteristics:

(1) Data as the core factor of production. Data has become a factor of production alongside land, labor, and capital. Different from traditional means of production, data has the

characteristics of non-scarcity, sharing and high scalability, which makes it widely used in all fields of society and become a new engine for economic and social development.

(2)Algorithm-driven intelligent production mode.AI uses technologies such as deep learning and natural language processing to transform complex data into decision support and action. For example, in the medical field, AI-driven big data analysis can significantly improve the efficiency and accuracy of diagnosis. In public management, intelligent algorithms can optimize resource allocation and policy design.

(3) Productivity shifts from physical resources to virtualization.AI and big data technologies are driving the process of virtualizing productivity. The rise of cloud computing and edge computing has enabled businesses and the public sector to go beyond traditional physical constraints and improve productivity through digital means.

(4) The characteristics and effects of new quality productivity have been explored in different fields, for example, the field of economics has emphasized the role of data in improving the efficiency of resource use, and the field of sociology has focused on the reshaping of labor markets and social structures by technology. However, most of these studies focus on the private sector and less on the application of new qualitative productivity in the field of public administration, which provides room for theoretical expansion of this study.

2.2. Evolution of Public Management Theories

2.2.1. The Transition from Traditional Bureaucracy to New Public Management and New Public Services

Public management theory has undergone several evolutions from traditional bureaucracy to new public management (NPM) to new public service (NPS):

(1)Traditional bureaucracy. Traditional public management theories are centered on Weber's bureaucracy, emphasizing a bureaucratic structure, clear separation of powers and responsibilities, and strict institutional norms. This model works well in a stable environment, but its hierarchical structure leads to rigid management and slow response in the face of rapidly changing technological and social needs.

(2)New Public Administration. In the 80s of the 20th century, the rise of new public management, market-oriented and performance-oriented, introduced the management concept of the private sector, emphasizing efficiency and service quality. However, NPM has been criticized for focusing too much on economic efficiency and ignoring public value and citizen engagement.

(3) New public services. At the beginning of the 21st century, the new public service theory emerged, advocating citizen-centeredness, collaborative governance and shared decision-making. NPS emphasizes service rather than control, with more emphasis on social collaboration and the public good. However, NPS still faces the problems of insufficient information and high cost of collaboration in practice, which leaves room for theory and practice for a new public management model supported by technology.

2.2.2. Deficiencies and Improvements in Current Public Management Theories

Although public management theories are constantly improving, in the face of the era driven by AI and big data, the existing theories are still insufficient:

(1)Lack of adaptability to data-driven decision-making: Traditional theories focus more on procedural norms and are difficult to adapt to the needs of real-time data updates and dynamic decision-making.

(2)Insufficient focus on technology-enabled governance: Existing frameworks fail to fully tap the potential of technology to optimize resource allocation and stakeholder collaboration.

(3)Ignoring the governance logic of complex systems: In the face of cross-departmental and multi-domain problems, existing theories lack an integrated perspective to deal with complex governance scenarios.

These deficiencies show that public management theory needs to be combined with new qualitative productivity to explore new frameworks from the theoretical and practical levels.

2.3. Theoretical Implications of AI and Big Data for Public Management

2.3.1. Theoretical Basis for Scientific and Precise Decision-Making

AI and big data provide theoretical support for scientific and accurate decision-making in public management:

(1)Data-supported decision-making: Through the analysis of historical and real-time data, AI can provide more accurate predictive models and optimization solutions for policy making. For example, intelligent signal control systems in traffic management can optimize traffic efficiency through real-time traffic data.

(2)Algorithms improve decision-making efficiency: AI algorithms can handle complex nonlinear problems and help governments quickly find a balanced solution in the case of multi-objective conflicts. This ability significantly improves the efficiency and scientificity of decision-making.

These implications require public management theory to incorporate data-driven into the core framework and redefine the theoretical basis of the decision-making process.

2.3.2. Technical and Logical Support for Stakeholder Collaborative Participation

AI and big data technologies offer the possibility of collaborative stakeholder engagement by reducing information costs and improving collaboration efficiency:

(1) Information transparency: Blockchain technology can realize data sharing and evidence storage, and improve the transparency of public affairs processing.

(2)Collaboration platform: Big data analysis can integrate the needs of multiple stakeholders, and the intelligent collaboration platform can dynamically adjust the task allocation and goal matching of participants.

3. Theoretical Basis

3.1. The Core Connotation of New Quality Productivity

3.1.1. The Value Transformation Mechanism of Data as a Factor of Production

In the traditional theory of productivity, the factors of production include labor, capital, and land. However, with the rapid development of information technology and digital economy, data is regarded as a new factor of production and has a high potential for value transformation. Data as a factor of production is unique in that it is:

(1)Non-scarcity: Unlike traditional natural resources, data can be used multiple times without being depleted, and this replicability and sharing allows it to create value in multiple domains.

(2)Scalability: Data can be analyzed and mined to generate new information that can further optimize production and decision-making processes.

(3).Network effects: The value of data grows exponentially with the size of users and the frequency of interactions, making data a core driver of the platform economy and digital society.

In the process of value transformation, the role of data is reflected in optimizing resource allocation, predicting future trends, and supporting decision-making. For example, through the analysis of public transport data, governments can optimize transportation planning, reduce congestion, and improve the efficiency of public services. This data-driven value transformation mechanism forms the basis of new qualitative productivity.

3.1.2. Productivity Leaps Driven by Algorithms and Smart Technologies

Algorithms are an important bridge to realize the value of data, and they empower intelligent decision-making and automated operations through the calculation and analysis of complex data. The development of artificial intelligence technology, especially deep learning algorithms, has made algorithm-driven productivity leaps possible. This transition is mainly reflected in:

(1) Efficiency improvement: Intelligent algorithms can quickly process massive amounts of data, significantly improving the efficiency of analysis and decision-making. For example, facial recognition technology in the field of public safety can quickly screen for suspicious targets and optimize law enforcement efficiency.

(2)Innovation push: Algorithms excel at discovering hidden patterns between data, driving innovation in production and service models. For example, smart healthcare systems use algorithms to analyze patient data and provide personalized treatment plans, significantly improving the quality of medical services.

(3)Intelligent autonomy: Intelligent technology realizes independent decision-making ability through the embedding of algorithms, making the operation of complex systems more efficient and accurate.

The new qualitative productivity driven by intelligent technology makes data, computing power, and algorithms complement each other, building a new ecology of productivity leap.

3.1.3. The Place of Human-robot Collaboration in the Productivity Paradigm

With the widespread application of artificial intelligence, human-machine collaboration has become an important part of new quality productivity. In this collaborative model, human ingenuity and the computing power of technology combine to increase the overall level of productivity. Human-robot collaboration is mainly manifested in the following three aspects:

(1)Complementary strengths: The combination of machines excelling at data computation and repetitive tasks, and humans excelling at creative thinking and emotional communication, can significantly improve efficiency and effectiveness.

(2) Real-time interaction: Intelligent systems can adjust work plans based on real-time human feedback, forming a dynamic and optimized collaborative relationship. For example, in smart city management, the combination of manual scheduling and automation systems effectively improves emergency management capabilities.

(3)Collaborative innovation: Human-machine collaboration promotes the transformation of productivity from single labor to integrated innovation, providing a new way to solve complex problems.

This new productivity paradigm with human-machine collaboration as the core is changing the traditional labor relations and production organization forms.

3.2. The Traditional Logic of the Theoretical Framework of Public Management

3.2.1. Bureaucracy: Rational and Hierarchical Management Model

Bureaucracy is the foundation of traditional public management theory, proposed by Weber, and its core features include hierarchical structure, rule-orientation, and rational control. This management model is efficient in a stable environment and is suitable for handling normalization and standardization tasks. However, it places too much emphasis on hierarchical authority and procedural characteristics, and shows a lack of responsiveness in the face of dynamic changes and complex problems. For example, in the face of public emergencies, the hierarchical decision-making process often leads to delays in action and makes it difficult to respond quickly.

3.2.2. New Public Management: Market Logic and Performance Orientation

In the late 20th century, the New Public Management Theory (NPM) came into being, with market logic as the core, emphasizing efficiency, cost control and service quality improvement. By introducing private sector management tools such as outsourcing, performance appraisal, and competition mechanisms, NPM seeks to improve the efficiency of public sector services. However, this model may ignore public value and social equity in the context of excessive pursuit of performance, leading to imbalances among stakeholders.

3.2.3. New Public Services: Citizen Engagement and Collaboration Networks

The New Public Service Theory (NPS) focuses on citizen participation, advocates collaborative governance and multi-party cooperation, and emphasizes the service attributes of public management. Its goal is to unite government, society, and business to solve public problems through a collaborative network. However, the practice of NPS often faces the problems of information asymmetry and high collaboration costs, which limit its practical effect. These deficiencies provide room for technology-enabled innovation in public management.

3.3. Theoretical Intersection and Construction Path

3.3.1. The Basic Logic of the New Qualitative Productivity Reshaping the Theory of Public Management

The reshaping of public management theory by the new qualitative productivity stems from its core characteristics of data-driven and intelligent decision-making. By introducing new qualitative productivity, public management theory can shift from traditional hierarchical and standardized to data-driven and dynamically adaptive:

(1)From process-oriented to result-oriented: Data analysis and intelligent algorithms enable managers to focus on achieving results, rather than sticking to process norms.

(2)From one-way management to two-way interaction: The new quality of productivity promotes information sharing and interactive feedback between the government and citizens, and improves the possibility of collaborative governance.

(3) From static to dynamic governance: Real-time data and predictive models enable public administrations to respond quickly to changes in complex environments, enhancing their resilience and adaptability.

3.3.2. Organic Integration of Data, Algorithms and Management Decisions

In order to achieve dynamic updating of theories, public management needs to integrate data, algorithms and decision-making processes:

(1)Data-driven decision-making: Through in-depth mining of historical and real-time data, governments can formulate policies and optimize resource allocation more scientifically.

(2)Algorithm-assisted decision-making: Intelligent algorithms can simulate the implementation effects of different policies, provide managers with a variety of alternatives, and reduce decision-making risks.

(3)Integration of technology and value: In the process of algorithm-driven, public management needs to maintain its adherence to public value and avoid social alienation caused by excessive technology.

4. Research Hypothesis and Analytical Framework

4.1. Research Hypothesis

Based on the new qualitative productivity driven by artificial intelligence (AI) and big data, this study explores its impact on the reshaping of the theoretical framework of public management, and puts forward the following three hypotheses.

4.1.1. Hypothesis 1: New Qualitative Productivity Driven by AI and Big Data Can Improve the Scientific and Efficient Decision-Making of Public Management

In the field of public management, the traditional decision-making model is often based on historical experience and limited data, and its scientificity and efficiency are limited by factors such as high cost of information acquisition and poor real-time performance. The new quality productivity optimizes the decision-making process through data-driven and intelligent algorithms, and significantly improves the scientificity and efficiency of decision-making. For example, big data analytics can help governments quickly grasp the changing trends of public demand, while AI technology can simulate multiple scenarios based on complex data, providing decision-makers with more accurate policy choices.

Practical cases show that AI and big data are particularly prominent in emergencies. For example, in epidemic prevention and control, AI prediction models help governments identify potential risk areas in advance, and big data technology improves resource allocation efficiency through real-time monitoring. Based on this, this study hypothesizes:

H1: New qualitative productivity driven by AI and big data can improve the scientific and efficient decision-making of public management.

4.1.2. Hypothesis 2: New Quality Productivity Promotes the Structural Transformation of the Public Management Model from Management to Service

Traditional public management is mainly based on a management model, emphasizing centralized control of social affairs through a hierarchical organizational structure. However, with the penetration of AI and big data technology, public management is gradually transforming to a service-centric model. New Quality Productivity enables the public sector to identify and meet public needs more efficiently through accurate data analysis and intelligent service delivery, thereby driving a structural shift from management to service. For example, in the construction of smart cities, the government has realized the transformation from "unified control" to "personalized service" by integrating transportation, energy, and environmental data to optimize the supply of public services in real time.

The core of this transformation lies in the update of service concepts and the support of technical tools, the participation of AI technology makes services more accurate, and the data sharing mechanism enhances the collaboration ability of all parties in society. Therefore, this study hypothesizes:

H2: The new quality productivity has promoted the structural transformation of the public management model from management to service.

4.1.3. Hypothesis 3: The Reshaping of the Theoretical Framework of Public Management by New Qualitative Productivity is Moderated by the Policy Environment and Technological Development

The effect of new quality productivity is not uniform, but is significantly moderated by the policy environment and technological maturity. For example, in regions with better policy environments, government supervision of data governance, privacy protection, and technological innovation is more perfect, and new quality productivity can play a greater potential. However, in regions with low technical level or insufficient policy support, the application of AI and big data may face technical bottlenecks or legal obstacles, limiting their role in reshaping public management.

The policy environment includes privacy protection regulations, data sharing policies, and technical support programs. Technology maturity refers to the popularity of algorithm development capabilities, data processing capabilities, and technology applications. Therefore, this study hypothesizes:

H3: The reshaping of the theoretical framework of public management by new qualitative productivity is regulated by the policy environment and technological development.

4.2. Analytical Framework

In order to test the above hypothesis, this study designs an analytical framework to illustrate how new qualitative productivity can drive the reshaping of the theoretical framework of public management through core influence pathways and moderating variables.

4.2.1. New Quality Productivity → Data-driven Public Management → Scientific Decision-making and Precise Service

With data as the core element, New Quality Productivity provides a data-driven foundation for public management through big data analysis technology. The data-driven public management model is mainly reflected in the following two aspects:

(1)Scientific decision-making: Based on data mining and algorithm support, the government can have a more comprehensive understanding of social dynamics, predict potential risks, and formulate more scientific policies. For

example, in disaster emergency management, by analysing meteorological and geographic data, governments can provide scientific early warning and develop optimal resource allocation plans.

(2)Precision of services: By integrating cross-sector data, the public sector can provide personalized services according to the needs of specific groups. For example, personalized diagnosis and treatment plans in the medical and health field, and real-time travel suggestions in traffic management are all manifestations of service precision.

This path reveals the specific logic of the transformation of the public management model through data-driven new productivity.

4.2.2. New Qualitative Productivity → Human-Machine Collaborative Governance → Stakeholder Network Optimization

Human-machine collaborative governance is another important path for new quality productivity to promote public management innovation. In this model, artificial intelligence and big data technologies enhance the efficiency of collaboration between the government, enterprises and the public by assisting decision-making and optimizing resource allocation, which is manifested in the following ways:

(1) Multi-agent collaboration: AI technology can quickly integrate the needs of all stakeholders and achieve efficient resource matching by establishing a dynamic collaboration network. For example, the city brain system in a smart city can coordinate with government departments, businesses, and the public to solve traffic congestion problems.

(2)Transparency of governance: The application of big data and blockchain technology has improved the transparency of government actions and enhanced public trust in the government, thereby promoting deep multi-stakeholder participation.

This pathway shows that the new quality of productivity can help public management move from one-way control to multi-party collaboration through human-machine collaboration and stakeholder optimization.

4.2.3. Moderating Variables: Technology Maturity and Data Governance Policies

Technology maturity and data governance policy are the key moderating variables, which affect the effect of new qualitative productivity on the reshaping of public management theory:

(1)Technology maturity: The higher the level of technology, the more the potential of AI and big data can be fully realized. For example, intelligent transportation systems in technologically advanced regions can dispatch resources in real time, while similar systems in technologically less developed regions may be limited by insufficient computing power and lack of data.

(2)Data governance policy: Perfect privacy protection regulations and data sharing mechanisms can provide a good institutional guarantee for the application of new quality productivity. For example, the European Union's GDPR regulation sets a high standard for data governance, which reflects a strong policy support effect in data-driven public management.

5. Empirical Research and Case Analysis

The application of artificial intelligence and big data technology in the field of public management provides a good opportunity to combine theory and practice. Through empirical research and case analysis, we can gain a deeper understanding of how the new qualitative productivity reshapes the theoretical framework of public management, and provide a scientific basis for specific practice. This section discusses data sources and research methods, typical case analysis, and empirical results and discussions.

5.1. Data Sources and Research Methods

5.1.1. Data Sources

In order to ensure the scientific and reliable nature of the research, the data sources mainly include the following three categories:

(1)Open government data:This includes statistical data, policy documents, and public governance reports issued by government departments. For example, real-time traffic flow data in the field of traffic management and epidemic prevention and control data of the health code system provide valuable information support for the research.

(2) Artificial intelligence application cases: Collect successful cases of intelligent governance at home and abroad, covering smart cities, public health management and other fields. These cases not only provide a rich practical background for the research, but also provide empirical materials for model validation.

(3)Big data platform analysis: Data analysis platforms (such as Hadoop and Tableau) are used to process and analyze raw data, including data cleaning, variable extraction, and pattern recognition, to ensure the efficient use of research data.

5.1.2. Research Methodology

(1)Structural Equation Model (SEM):The SEM model is used to analyze the direct and indirect impacts of key variables of new quality productivity (such as technological innovation and data integration) on the improvement of public management efficiency. This approach can reveal complex relationships between variables and validate theoretical hypotheses.

(2)Text Mining: Using natural language processing (NLP) technology, semantic analysis of policy documents and case texts is performed to extract key themes and trends. This provides a combination of qualitative and quantitative support for research.

(3)Case Study Method: Through the in-depth analysis of typical cases, the application effects of artificial intelligence and big data in different public management scenarios are explored, and the interactive relationship between practice and theory is revealed.

5.2. Typical Case Analysis

5.2.1. Case 1: Data-driven Governance in Smart City Construction

(1)Case Description: AI-optimized paths in urban traffic management. In the construction of smart cities, traffic management is a typical field for the application of artificial intelligence technology. For example, the "City Brain" project in Hangzhou uses AI technology and big data to achieve intelligent optimization of traffic management. By collecting traffic flow data in real time, the system automatically analyzes the congestion of major roads in the city and dynamically adjusts the traffic light signals. The results showed a 20% reduction in the average travel time of urban traffic and a 10% reduction in the traffic accident rate.

(2)Analysis: How does the new quality of productivity change the traditional urban governance model? This case

shows that the core characteristics of new quality productivity are technology-driven and data-empowered. Compared with the traditional manual control mode, AI and big data technology can monitor and predict traffic flow changes in real time, significantly improving the efficiency of governance. This model not only reduces management costs, but also optimizes the travel experience of citizens, reflecting the potential of new quality productivity in urban governance.

5.2.2. Case 2: Intelligent Decision-making in Public Health Management

(1)Case description: Big data analysis and prediction in epidemic prevention and control

During the pandemic, the health code system has become an important tool in China's public health management. By integrating residents' health information, travel trajectories, and nucleic acid test results, the government is able to monitor the development of the epidemic in real time and take swift measures. In addition, big data modeling technology is used to predict epidemic trends, providing a scientific basis for medical resource allocation and policy adjustment. For example, during the outbreak in Wuhan, big data analytics helped the government determine the optimal location and resource allocation for mobile hospitals.

(2)Analysis: AI and big data improve the efficiency and credibility of public management

This case illustrates the role of AI and big data in improving the efficiency of public management and enhancing the credibility of the government. Through accurate monitoring and prediction of the epidemic, the government can quickly respond to emergencies and deliver scientific and reliable information to the public. This not only improves the efficiency of policy implementation, but also enhances the society's trust in government decision-making.

5.3. Empirical Results and Discussions

5.3.1. Relationship Analysis between Key Variables

Based on the results of Structural Equation Model (SEM) analysis, the relationships of the following key variables are revealed:

(1)Technological innovation and data integration: Technological innovation has significantly improved data integration capabilities, which are important mediating variables for improving the efficiency of public management.

(2)New quality productivity and public service quality: New quality productivity directly promotes the improvement of public service quality by improving the efficiency of resource allocation and information transparency.

(3)Public participation and government credibility: The introduction of technological means has enhanced the convenience and breadth of public participation, which in turn has further improved the credibility of the government.

5.3.2. The Empirical Results Support the Construction of the Theory

Through empirical analysis, the following conclusions provide important support for theoretical construction:

(1) New quality productivity is an important driving force for public management innovation: Both case studies and empirical data show that artificial intelligence and big data technology have unique advantages in resource optimization, scientific decision-making, and public service improvement.

(2)The integration of technology and governance system is the key: the application effect of technology not only depends on its own advancement, but also closely related to the synergy of the governance system. The governments in the successful cases have demonstrated strong technology absorption capabilities and a sense of management innovation.

(3)Theoretical frameworks need to balance efficiency and equity: Despite the efficiency gains of technology, governance systems need to focus on equity to avoid technological divides and social injustices.

6. Conclusion and Implications

6.1. Conclusion

Through an in-depth analysis of artificial intelligence (AI) and big data-driven theories of new qualitative productivity and public management, this study draws the following main conclusions:

(1) The new qualitative productivity led by AI and big data is profoundly reshaping the theory of public management. Traditional public management theories take manpower, capital, and resources as the core production factors, while AI and big data, as important components of new qualitative productivity, not only change the way of resource allocation, but also promote the in-depth innovation of theories. From the management mode that focuses on experience and traditional mode, it has gradually shifted to a scientific management model that relies on data and intelligence.

(2) Data-driven and intelligent decision-making are the core pillars of future public management theory. Big data analytics and AI algorithms enable governments to allocate resources and solve social problems more efficiently. The future of public management will be more transparent, intelligent, and efficient than in the past, when decisions relied primarily on leadership experience and a single source of truth.

(3) Collaborative governance and precise service will become the mainstream mode of public management in the new era. With the popularization of new quality productivity, the cooperation between multiple subjects has become more and more close, and the governance mode of public affairs has changed from single-subject management to multi-subject collaboration. At the same time, based on data mining and AI analysis, the supply mode of public services will shift from wide coverage to more personalized and precise, further improving the efficiency of social governance.

6.2. Theoretical Contributions

At the theoretical level, this study mainly contributes to the following aspects:

(1) A new theoretical framework of public management adapted to the era of AI and big data is constructed. On the basis of analyzing the limitations of traditional public management theories, combined with the characteristics of AI and big data-driven new qualitative productivity, a new theoretical framework with data-driven, intelligent decision-making and collaborative governance as the core is proposed, which provides a new perspective for the field of public management.

(2) It enriches the management theory system in the context of new quality productivity. This study incorporates new qualitative productivity into public management research, deepens the understanding of the interaction between technology and society, supplements the gap of existing management theories, and provides theoretical support for further research on the social impact of AI and big data technology.

6.3. Practical Inspiration

Based on the conclusions of the study, this study puts forward the following implications for public management practice:

(1) The government should formulate technology and data governance policies that adapt to the new quality of productivity. In the face of the rapid development of AI and big data technology, the government needs to formulate clear policies for data openness, sharing, and security protection, strengthen attention to technology ethics, ensure fairness and transparency in the application of technology, and effectively prevent technology abuse and data privacy risks.

(2) The practice of public management should strengthen the deep integration of technology and social system. In the process of policy design and implementation, it is necessary to pay attention to the matching of technical capabilities with social needs, and transform the technical potential of AI and big data into practical results in improving the quality of public services. For example, in the fields of education, medical care, and transportation, technology empowerment is used to improve service accuracy and meet personalized needs.

6.4. Research Limitations and Prospects

(1) Limitations: This study has certain limitations in sample coverage and time span, and the results may not fully reflect the long-term and comprehensive impact of new quality productivity on public management. In addition, the complexity and diversity of technology applications can also lead to certain factors being under-considered in research.

(2) Prospects: Future research can be further extended to the fields of international comparison and technology ethics. For example, what are the differences in public management models in the context of new qualitative productivity in different countries? How to strike a balance between technological innovation and ethical challenges? These issues need to be further explored to improve the theory of public management and guide the development of practice.

In summary, this study not only deepens the understanding of the impact of AI and big data-driven new qualitative productivity on public management, but also provides specific guidance and suggestions for practice. In the future, in the context of globalization and technological diversification, public management research and practice will face more opportunities and challenges, and it is necessary to continue to explore the collaborative development path of theory and practice.

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