Knowledge Production and Significance Construction of Public Management in the Digital Age

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Abstract: This paper explores the knowledge production and meaning construction in public administration in the digital age. The development of digital technologies has put the traditional public management paradigm in a dilemma. Therefore, it is necessary to reconstruct the dimensions of knowledge production, including changes in ontology, methodology, and epistemology. In terms of meaning construction, there are cycles of deconstruction and reconstruction of the value system and competitions in governance rationality paradigms. Knowledge production and meaning construction form a dynamic adaptive system. In the digital age, China has innovated and transformed its reform methodology. The research suggests establishing a balanced mechanism of "agile knowledge production — flexible meaning construction" to meet the public management needs of the digital age and move towards a knowledge ecosystem of resilient governance.

Keywords: digital age; public administration; knowledge production; meaning construction; complex adaptive system

1. Introduction

With the rapid development of digital technologies such as big data and cloud computing, the characteristics of the digital age have become increasingly distinct[1]. The knowledge revolution has entered the intelligent stage, and the cognitive revolution has reshaped the logic of social operation, significantly impacting public administration. The traditional classic paradigm centered around the "government — market — society" ternary structure has revealed its inadequacy in explanatory power when confronted with new issues in the digital age, such as the regulation of platform economy and the definition of algorithmic administrative responsibilities. Meanwhile, the "space-time collapse" triggered by digital technologies challenges the traditional logic of hierarchical organizations. Against this backdrop, a transformation in the research paradigm is urgently needed. Complexity science offers a new perspective for public administration, facilitating the shift of the knowledge production model from linear causality to dynamic emergence, helping the discipline break through its predicaments and better address public management issues in the digital age[2].

2. Reconstruction of the Three Dimensions of Knowledge Production

2.1 Ontological Reconstruction: The Digital Proliferation of Public Management Objects

In the digital age, data has become a key production factor, and the process of data factor capitalization is advancing steadily. Data resourceification is the foundation. Through technologies such as data mining and analysis, valuable data is identified and labeled, creating scarcity and promoting data flow[3]. Data capitalization, on the other hand, is about clarifying property rights for expected returns, defining the ownership and value attributes of data so that it can generate continuous returns in the future. This capitalization process establishes a sound property rights system, ensuring the transaction and circulation of data and maximizing its value.

The capitalization of data has significantly expanded the objects of public management governance. In virtual communities, users generate massive amounts of data, and the management and order-maintenance of this data have become new issues. Algorithmic power is widely applied in various fields, and there is a need to regulate its operation and supervision[4]. Digital twin cities map real-world cities into virtual spaces, enabling intelligent and refined urban management.

2.2 Methodological Revolution: Paradigm Breakthrough of Computational Social Science

In the digital age, computational social science brings a new perspective to public administration, driving the transformation of the research paradigm from empirical-qualitative to data-driven quantitative.

Agent-Based Modeling (ABM) in social simulation has significant advantages in policy experiments. Traditional urban traffic congestion governance relies on field surveys, questionnaires, and expert experience[5]. The samples are limited, and it is difficult to comprehensively reflect dynamic changes. When formulating traffic restriction policies, it is challenging to

predict their impacts. In contrast, ABM abstracts residents, enterprises, etc. as agents, constructs models of urban roads and behavior rules, simulates changes in citizens' travel under different traffic factors and their impacts on congestion, predicts policy effects in advance, and reduces the cost of trial-and-error.

2.3 Epistemological Evolution: Consensus-Building Mechanisms in the Post-Truth Era

In the post-truth era, emotions and personal beliefs exert a profound influence on public perception. The epistemology of public administration is in urgent need of transformation, and the establishment of new consensus-building mechanisms is pressing. Although the algorithm-based recommendation systems in the digital age have enhanced the efficiency of information acquisition, they have also given rise to the "filter bubble". These systems deliver information based on users' behaviors and interests, confining users within a cocoon of homogeneous content and making it difficult for them to be exposed to diverse perspectives. This has a far-reaching impact on public agenda-setting.

In the initiation phase, due to the filter bubble, the public's understanding of social issues becomes one-sided. For example, in discussions about social elderly care, users who favor the traditional family-based elderly care model may struggle to access information about new models such as community-based elderly care and smart elderly care. This restricts their comprehensive understanding of the elderly care issue, influencing the way problems are framed and the approaches to their solutions.

3. The Two-way Movement of Meaning Construction

3.1 The Deconstruction-Reconstruction Cycle of the Value System

In traditional public management, the supremacy of efficiency prevails, emphasizing the maximization of output benefits with the least input of resources. Entering the digital age, although this concept has streamlined administrative processes and improved speed, it has also exposed numerous problems. Among them, the risk of the "technological Leviathan" in digital administration is particularly prominent. With the extensive penetration of digital technology in the administrative field, technology has gradually formed a powerful and uncontrollable force. Take the application of generative artificial intelligence technology in government services as an example. Its "self-regulatory" feature may cause the technology to break away from human cognition and control, making administrative decisions overly reliant on technology, and thus neglecting multiple values such as social fairness and civil rights.

To resolve this dilemma, it is urgent to construct a new public value framework. At the level of technology ethics, algorithms, as the core of digital technology, are widely used in public management decision-making. However, biases in algorithm design may lead to unfair decisions. Therefore, in the entire life cycle of algorithms, principles of fairness, transparency, and interpretability should be adhered to, algorithmic discrimination should be eliminated, and citizens' equal rights should be guaranteed. In terms of digital human rights, data has become an important asset in the digital society, and individuals possess data sovereignty, covering rights such as control and privacy. When the government collects and uses citizens' data, it must follow the principles of legality, legitimacy, and necessity. In the construction of smart cities, data should be strictly protected to prevent leakage and abuse. Ecological rationality requires that the development of digital technology be coordinated with ecological protection and social sustainable development. For example, energy-saving technologies should be adopted in the construction of data centers to reduce energy consumption and carbon emissions, achieving the sustainable development of technology.

3.2 The Paradigm Competition of Governance Rationality

In the digital age, the tension between technocratic governance and humanistic governance has become increasingly prominent. Technocratic governance addresses social issues through means such as data quantification analysis and model prediction, pursuing efficient governance. For example, in urban planning, it focuses on traffic flow and resource allocation efficiency, and uses intelligent transportation and big data for layout planning. On the other hand, humanistic governance attaches great importance to human values, dignity, and emotions, and pays attention to social relationships and cultural traditions. When planning cities, it takes into account residents' living experiences and the inheritance of community culture.

4. The Co-evolutionary Mechanism of Knowledge and Meaning

4.1 Construction of the Dynamic Adaptive System Model

In the digital age, knowledge production and meaning construction form a complex dynamic adaptive system. The feedback loops of this system can be presented through system dynamics modeling. Knowledge production lays the theoretical and practical foundation for meaning construction. For instance, the application achievements of digital technologies in

public administration promote the renewal of value concepts and governance goals in public management. The application of big data analysis in public policy evaluation, for example, has led to a shift in evaluation criteria from merely focusing on results to emphasizing process data monitoring and dynamic adjustment.

Conversely, meaning construction has a reciprocal effect on knowledge production. New value orientations, such as algorithmic fairness, will guide researchers to conduct knowledge-producing activities in algorithm design, supervision, etc. The two interact with each other, forming a circular feedback that propels the development of public administration.

4.2 Evolutionary Paths in the Chinese Context

In the digital age, China's traditional reform methodology of "crossing the river by feeling the stones" is undergoing a profound transformation. In the past, this methodology focused on groping and accumulating experience in practice. Nowadays, big data and artificial intelligence technologies have injected new connotations into it. When formulating policies, the government uses massive data analysis to simulate policy effects, anticipate potential problems, and enhance the scientific nature of decision-making. For example, in the formulation of urban waste-sorting policies, by analyzing the living habits and waste generation amounts of residents in different communities, targeted plans are developed, and flexible adjustments are made based on real-time monitoring data, realizing a shift from trial-and-error based on experience to precise exploration driven by data.

5. Conclusion

In summary, knowledge production in public management in the digital age exhibits "quantum-like" characteristics. Knowledge exists in multiple superimposed states, with interconnections showing entanglement, and the observer effect occurs due to the influence of researchers and the environment. The analytical framework of public management constructed from the perspective of the Complex Adaptive System (CAS) effectively explains the dynamic adaptation and co-evolutionary processes of knowledge production and meaning construction, laying a solid theoretical foundation for the development of the discipline.

In practice, it is of great significance to establish a dynamic balance mechanism of "agile knowledge production-flexible meaning construction". This involves quickly responding to technological changes to update knowledge and flexibly adjusting value concepts and governance models, so as to adapt to the complex and changeable public management needs in the digital age. This will promote the field of public management to move towards a knowledge ecosystem of resilient governance.

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