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A Study on the Change Path of Public Administration Mode in the Era of Big Data

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Abstract

The advent of the big data era presents social public administration with a host of novel opportunities and challenges. Harnessing the capabilities and guiding influence of big data in a scientific manner is essential for enhancing the current standards of social and public administration. This paper delves into the critical issues confronting the existing public administration model within the big data context, including information security concerns, challenges in information integration, and the lack of information awareness among staff. It proposes targeted reform measures aimed at fostering the evolution of the public administration model to better adapt to and thrive in the new era.

Keywords

Public Administration, Big Data Era, Social Governance

1. Big Data

1.1 Connotation of the Big Data Era

First and foremost, big data transcends a mere quantitative descriptor; it is an encompassing technology that harnesses vast datasets to convey rich information. It stands as a pivotal catalyst in our rapidly evolving era, where the very fabric of social production and daily life has been reshaped by the advent of the big data era. With the strategic application of data-driven technologies and the execution of well-crafted data strategies, big data emerges as a formidable engine for propelling societal progress. The deployment of big data technologies can markedly expedite advancements in the realms of social public administration and public service.

McKinsey, a globally esteemed consulting firm, encapsulates the essence of big data's pervasive influence, stating, "Data, now woven into the fabric of every industry and business function, has

evolved into a vital production factor." Since the seminal concept of big data was introduced by the prestigious journal *Nature* in 2008, it has catalyzed explosive growth in its application across various facets of social life. Big data has revolutionized the trajectory and methodology of societal development in science and technology, culture, politics, the economy, and everyday life at an astonishing pace. In this epoch marked by the swift advancement of electronic computer technology, the proliferation of data resources has given rise to expansive databases within the information network, heralding a novel knowledge system that fuels human advancement.

The big data age can be summarized into two major categories. It is initially an age of knowledge dissemination, in which traditional structures and routes for transmitting information are completely rebuilt. A modern knowledge system is built by aggregating and concatenating massive data sets. Since then, big data informatization tools have evolved into a platform-based driving force for development, necessitating the use of vast amounts of information from technologies and products in the formative stage, as well as the processing of useful knowledge. At the end of the day, the advent and growth of the big data era also symbolizes a demand for us to innovate with our cognitive models and knowledge architectures so that they can be enabled into this new paradigm if we truly want to advance as society.

1.2 Characteristics of the Big Data Era

The Big Data era is defined by several characteristics, the first of which is "size". Big data is typically very huge, such as petabytes (P), exabytes (E), and zettabytes (Z), which reflect the never-before-seen magnitude of information available to be analyzed on a scale that we are not accustomed to working with raw. This relevance naturally lays the groundwork for diversity in the data types themselves. Advanced processing capabilities are required to extract useful insights from a variety of data sources, including online logs, audio files, videos, photos, and geo-location data.

The third most distinguishing feature of big data is its lack of value density: many items in these huge pools are only seen a few times. With such a vast volume, the challenge is that there are nuggets of gold in those hills somewhere - and they must be able to distinguish useful information from massive quantities of less relevant data using sophisticated technological approaches. The fourth attribute is timeliness, which requires quick data processing. This distinguishes it from traditional data mining, in which the rate of analysis may be more manageable. In today's fast-paced digital world, the deluge of growing data is much too much for even the most sophisticated technical infrastructures to handle. That means firms must quickly process and evaluate all of that data in order to transform their significant investment into results, or they risk losing out.

The era of big data has thus introduced novel challenges to our capacity to harness data effectively. Yet, it also opens up unprecedented opportunities for deeper and more comprehensive understanding. The acceleration of information technology has rendered the Internet a critical medium for data, with search engines, social media, and business platforms all playing pivotal roles in data extraction, sharing, and aggregation. This data-driven environment not only fuels public discourse, transforming minor incidents into major news stories but also empowers governments and businesses to make decisions

that are more precise and timely. These capabilities are hallmarks of the transformative potential of the big data era.

2. Classification of Public Administration Models

Over the past decades, digital technologies have become ubiquitous, impacting and changing the ways society operates. Immense public and economic value is being created by improving access to information and resources (Desai & Manoharan, 2024). Public administration stands as a pivotal endeavor in the construction of a harmonious society and the stabilization of social development, serving as a robust form of governance (Jin, 2024).

The models of public administration are primarily categorized into three distinct approaches. The first is the intervention model, characterized by the authoritative management and intervention of societal development by power organizations. Here, public entities assume a dominant role, while the market operates in a more peripheral capacity. This model fosters a stable hierarchical structure where public organizations wield considerable influence over social affairs. However, it is not without its drawbacks. The static nature of this relationship can engender a lack of responsibility and crisis awareness among administrative staff, a propensity for rule-following, and a susceptibility to disciplinary infractions. Its limitations are stark in the face of contemporary social evolution, potentially hindering market development (Cha, 2019).

Contrastingly, the market model positions the government as a facilitative force, synergizing with the market to foster its ongoing expansion. In this paradigm, the government relinquishes its monopolistic stance, allowing the market to assume a more central role, thus engendering a flexible and dynamic environment. The market model anchors economic activities in market-oriented development, underpinned by contracts, performance-based wages, and other mechanisms that safeguard the rights and interests of all stakeholders, ensuring the full protection of public interests (Hu, 2021).

Lastly, the service-oriented model places the populace at the heart of its operations, adhering to the principle of pursuing the interests of the people. This model considers the rights and interests of the public as its starting point, adopting a public stance to devise social governance strategies that enhance the efficacy of social governance and elevate the quality of public services.

3.1 Information Security Issues

In recent decades, public organizations have undergone significant changes related to digitalization. These changes are the result of multiple, varying influences, such as external institutional feedback (Karin & Jonas, 2024). In the big data era, the accessibility and analysis of information have been greatly facilitated, offering unprecedented convenience for users. However, this convenience comes with an increased risk to information security. The prevalent practice of storing data in cloud-based databases, while enhancing the speed and convenience of data retrieval, exposes it to the complexities and vulnerabilities of network environments. A single security breach in the processing or utilization of information can compromise entire databases, potentially leading to the loss of data integrity and

privacy violations.

User information security maintenance and database safety overall defense capabilities are being put to the test in the field of social public administration. This increases the risks since public administration units lack institutional management competence and technical experience. Simultaneously, there are a number of large data units that are underutilized and underdeveloped, with little control over administrative operations. Databases, on the other hand, are trapped in the internet's essentially open environment and are constantly under attack by hackers/viruses, resulting in an unstable information tech-sharing system in response to emerging safety risks. Data protection in the public sector necessitates a smart approach. Large volumes of data, compliance, and record keeping rules also raise the need for caution while handling big data, not to mention that additional requirements will result in even greater oversight of these resources as cyber dangers continue to escalate.

3.2 Information Integration Issues

Because of the variety of data formats and validation criteria, specific datasets are frequently isolated from the rest of an organization's information architecture. This type of isolation occurs when data is incompatible across systems, resulting in islands that resemble informational silos. This not only impedes the proper collection of data in its entirety, but also hinders public sentiment analysis for good because true and substantial evidence is lacking to support any conclusions drawn. The most recent development in big data in China is that the usage rate of massive cache data and information resources is rather low. To address current issues, norms and standards must be refined. Due to the lack of standardized information construction standards, information silos are a major problem for data reliability.

Furthermore, no established and precise standards for evaluating information have arisen. Based on these criteria, a significant lack of integration occurs in organizations, resulting in significant obstacles to the flow of information/data required to carry out useful efforts regarding school administration reforms. Without basic standards and trustworthy assessment methodologies that can be applied across a wide variety of data granularities, it becomes impossible to creatively synthesize various datasets such that they can contribute significantly to public policy or governance.

3.3 The Problem of Weak Information Service Awareness among Administrative Staff

In the Internet era, the rapid evolution of big data technology has positioned it as a key asset within the field of public administration. Despite its widespread application, a significant gap remains in the understanding and utilization of big data among some administrative staff. This shortfall in comprehension often leads to an undervaluation of the technology's potential contributions to the sector. The limited proficiency in big data technology among staff, coupled with an absence of Internet-centric thinking and a lack of big data awareness, has perpetuated outdated approaches to public administration. This results in a model that struggles to keep pace with the accelerating demands of societal progress. Traditional mindsets prevail, with adherence to established rules and regulations taking precedence over innovative thinking, thereby affecting the overall quality of work.

Furthermore, the insufficient application of big data and Internet technologies in certain departments perpetuates reliance on conventional methods for information gathering and analysis. This approach is characterized by a deficiency in data application capabilities and an inadequate extraction of valuable insights, hindering the full capture of relevant information. The inability to harness the analytical power of big data effectively is detrimental to the scientific rigor of public administration decision-making and impedes the innovation of the public administration model.

4. Appropriate Response

4.1 Enhancing Big Data Security through Advanced Technological Safeguards

The rapid development of computer technology and the Internet has propelled mankind into the era of big data. Thanks to the Internet, human beings have broken time and space limitations, and information exchange has become unprecedentedly flexible. As we all know, the Internet is characterized by a certain degree of openness, and it is this openness that leads to network information security threats. Due to the existence of hackers and viruses, network information is often leaked. Some confidential information, such as national defense and military data, as well as commercial secrets, has also been stolen and destroyed, with extremely harmful consequences. Criminals use illegal means to collect information and then sell it for huge profits, thus seriously undermining the network environment and social stability. Because of this, the government is a public service and manager, and it is the one who occupies a lot of information in its work. From this level, guaranteeing information security is the key to improving the level of public administration in society in the context of the big data era. Therefore, government departments need to actively do a good job of technical protection, improve the information security management mechanism, and make every effort to ensure information security. Further, regarding the collected information, public administration departments should make a detailed division to distinguish between private information and public information. Not only that, to improve the level of public administration, public administration should set up an open platform for government information so that government departments can be supervised by relevant departments and the public and release information available to the public on the platform, to safeguard the people's right to know and ensure the transparency of the office.

At the same time, the confidentiality of private information should be properly maintained, and scientific and effective methods should be adopted to ensure the security of data and information. In addition to this, the sense of responsibility of employees should be enhanced to avoid artificial leakage. Finally, legal means must be used to prevent illegal disclosure of information or illegal theft of information. Once there is illegal disclosure or theft of information, severe punishment should be imposed.

4.2 Integrating Heterogeneous Communication Channels for Robust Data Interconnectivity

First, when using big data technology for public administration, staff must improve efficiency from the perspective of meeting public needs to ensure that their work is more precise, detailed, rigorous, and

efficient (Karin & Jonas, 2024). The large volume and dispersion of data and information have led to information isolation, poor communication, and a lack of interconnection between different public administrations and service affairs. Under such circumstances, the functions of the government will be weakened, the phenomenon of information silos will become more and more serious, and the integration of information will become more difficult. To solve this problem, staff must use advanced technology to effectively divide different departments so that different departments can keep in touch and communicate at all times. Staff should also try to integrate big data information to realize information sharing and interconnection.

Secondly, in addition to horizontal interoperability among departments, vertical interoperability of information between higher and lower levels of departments is also important. Advanced cloud computing technology and network information technology can create central databases and unify various platforms so that information from different departments can be harmonized and aggregated. In the event of problems, they can be communicated and responded to first and play an effective coordinating role.

Thirdly, to ensure the organic integration of public administration and big data, it is necessary to give full play to the role of big data in terms of connectivity. And to solve the problem of information silos between different departments, in addition to strengthening management and utilizing advanced technology, it is also necessary to ensure that each department has information that can be shared and referred to, which touches on the issue of information division. Care must be taken to ensure that information is publicly available so that it can be accessed at any time.

Fourthly, a comprehensive information management mechanism must be developed so that the relevant personnel can comply with the relevant regulations and operate in strict accordance with procedures for ensuring information security. It is necessary to effectively distinguish between external network information and internal network information and to delineate the work to be emphasized. It is necessary to continuously improve the information application level of management personnel so that they have a good understanding of information security and effectively handle external network information and internal network information to meet the needs of public administration. Relevant personnel should handle relevant data and information promptly, and under the guarantee of a strict system, information exchange between different public services will become more practical, so that big data can give full play to its role in public administration and the level of public administration can be improved continuously, thus truly realizing the goal of innovation.

4.3 Integrating Various Teaching Methods

At first, thought is the precursor of action; the administration should conform to the development of the times, establish Internet awareness, arm the mind with Internet thinking, strengthen the awareness of Internet governance, and promote the change of public administration mode.

Secondly, the administration should be people-oriented, take the fundamental interests of the people as the root, and safeguard the people's rights and interests as the purpose, to promote the improvement of

the effect of administrative governance (Wu, 2023).

Third, realizing the updating of thoughts and concepts and establishing awareness of Internet governance are the prerequisites for promoting the innovation of public administration mode and the basis for promoting the continuous improvement of public administration mode. When applying Internet technology, it is necessary to strictly abide by the relevant regulations, to clarify the relevant laws and regulations, and to strengthen digital management. In the process, refined management should be implemented to improve the scientific nature of public administration (Yang, 2023).

Fourth, in the new era, everyone can become a data terminal. The public can all collect data, obtain information, and use data equally on the Internet platform, express their demands through Internet channels, and realize the release and dissemination of information. Therefore, the administration should do a good job of guiding the public. In fact, it should increase publicity and education efforts to publicize Internet technology and big data technology and guide the public to correctly understand the Internet and correctly use network technology.

Moreover, it should play a guiding role, establish a resource-sharing mechanism, improve the convenience of information use and collection, and enhance the interaction with the public. Lastly, it should apply big data technology to analyze the data and information, realize the collection and integration of information, enhance the relevant affairs' predictability, provide a basis for public administration decision-making, and enhance the level of public administration.

5. Conclusion

As the big data era reshapes public administration, we underscore the critical need for enhanced data governance and the integration of communication channels to bolster service quality. Addressing the challenges of information security and siloed data, we advocate for a proactive approach to harnessing big data's potential while ensuring transparency and security. The path forward lies in the continuous evolution of public administration, embracing technological advancements, and fostering a data-literate workforce. Future endeavors should aim to refine data governance frameworks and ethical guidelines, ensuring that the transformative power of big data serves the public interest effectively. In conclusion, the integration of big data into public administration is a strategic imperative for the modernization and improvement of governance. With a commitment to innovation and adaptability, we can navigate the complexities of the digital age and achieve a more efficient and responsive public service.

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