The role and interaction analysis of governance subjects in Big data-driven public security governance

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Abstract: This study explores the impact of big data on public safety governance in the 21st century. Through literature review, interviews and case analysis of the traffic management system in A city, this paper describes the application of big data in public safety governance, the role of governance subjects and their interaction mode. The results show that big data improves the real-time and accuracy of public safety information, and promotes the interaction among governance subjects. At the same time, challenges such as data ownership and access rights exist. Accordingly, relevant suggestions are put forward.

Key words: big data; Public security governance; Main body of governance; Interactive mode

Introduction

In the age of information explosion in the 21st century, big data technology has become a key decision-making driver, especially in the field of public security governance. Big data not only serves as a technological tool, but also profoundly reshapes governance structures, processes and participants. Critical areas of public safety, such as traffic management and disaster response, are demonstrating their value through data-driven decision-making. However, this also presents data security and privacy challenges. This study aims to explore how big data is changing roles and interaction patterns in public security governance, seeking to achieve more efficient and just governance in this context, and examining its impact on governance structures, decision-making processes and public interactions.

1 Literature Review

1.1 Existing applications and research of big data in public security governance:

In recent years, with the rapid progress of technology, the application of big data in public security governance has received widespread attention. Studies have shown that big data can provide more accurate and timely information, thereby improving the efficiency of public safety governance. Xia's research further confirms that using real-time traffic data analysis can effectively predict and reduce traffic accidents. It reveals the potential value of social media data in emergency response and management.

1.2 The role and interaction of governance subjects in traditional public security governance:

Traditionally, public security governance relies on traditional information collection and processing methods, with government departments, law enforcement agencies and other relevant organizations mainly playing the role of governance subjects. The interaction between these entities is based on fixed rules and processes, and the sharing of information may be restricted.

1.3 Existing theories and research on the relevance of governance agents:

The interaction between governance entities is a core topic of public governance research, especially in the context of big data, which not only enhances the interaction between governance entities, but also introduces new challenges such as data ownership, access rights, and the division of responsibilities.

Although the application of big data in public security governance has been extensively studied, how to clarify and understand the roles and interactions of governance actors in this context remains a relatively little-explored topic. In addition, although existing research has revealed how big data affects the efficiency and effectiveness of public safety governance, the questions of how governance agents adapt to these changes and how their interactions are affected are still not fully answered. In light of this, this study aims to delve into the roles and interactions of governance agents in the context of big data to fill existing research gaps.

2 Big Data and public security governance

2.1 Definition and core features of big data

Big data is beyond the processing capacity of traditional database software tools, and its characteristics are not only the growth of data volume, but more prominent is the diversity, speed and complexity of data. The core characteristics include: Volume: Big data involves a large amount of data; Velocity: the speed at which data flows in; Variety: a wide range of data sources, from structured databases to unstructured images; Veracity: Because of the variety of sources, the quality and accuracy of the data is critical.

Take traffic management as an example. Traffic data for big cities covers vehicle flow, traffic accidents, weather information, etc. These data are derived from sensors, cameras, and public feedback.

2.2 Application of big data in public safety management

Big data is reshaping the decision-making and practice of public safety governance:

Data-driven policymaking: Based on big data, governments can develop strategies more scientifically, such as the accurate delineation

of crime hotspots.

Dynamic adjustment and optimization: Relying on big data, strategies can be dynamically adjusted according to real-time situations.

Enhance early warning capabilities: For example, monitoring social media can detect abnormal public opinion in advance.

Increase public participation: The public can participate in the governance process by providing real-time data and feedback through various platforms.

3 Analysis of the role and interaction of governance agents

3.1 Brief analysis of the role of the governance subject

3.1.1 Definition and classification of governance subjects

A governance subject is an organization or individual that affects the governance of public security. In the era of big data, in addition to traditional governments and law enforcement agencies, there are also data providers, technology companies, research institutions and the public. They can be divided into: decision-makers, executors, analysts and information providers.

3.1.2 Overview of the main responsibilities

Decision-makers: such as the government, leading policy making. Executors: such as law enforcement, who implement the above policies. Analysts: such as technology companies, who provide decision-makers with advice based on big data. Information providers: such as the public, who supply raw data or feedback.

3.1.3 Impact of big data on governance entities

Take the big data analysis of traffic flow in a city as an example:

Decision maker: Based on the analysis, adjust the traffic strategy. Executors: such as the traffic department, adjust the actual management according to the strategy. Analysts: For example, technology companies that provide analysis of traffic data for decision makers. Information provider: Public feedback via social media to enrich data context.

Big data has enhanced the decision-making and execution precision of various governance entities, as well as enhanced coordination among them.

3.2 Interaction analysis of governance entities

3.2.1 Definition and characteristics of relevance among governance subjects

Relevance can be defined as the interdependence and influence relationships among governance entities. In the context of big data, this interconnectedness becomes more complex because multiple entities are involved in the collection, analysis and use of data.

3.2.2 Interaction patterns between governing entities in the context of big data

The traditional model of interaction may be linear, i.e., decision-makers formulate policies, executors implement them, and analysts provide feedback. But in the context of big data, the interaction between these agents may be networked, i.e. they rely on each other and jointly participate in the decision-making and implementation process.

3.2.3 How does big data affect the relationship and cooperation among governance entities

Take a real example: in a natural disaster, the government used big data technology to monitor the situation of the affected area in real time. The government (the decision-maker) partnered with a satellite technology company (the analyst) and used the satellite imagery it provided to assess the impact of the disaster. Meanwhile, the public (information providers) share real-time conditions and needs in disaster areas via social media. Based on this information, rescue teams (executors) are able to respond quickly and target resources precisely to where they are most needed.

This cooperation model demonstrates how, in the context of big data, various governance entities can work closely together to address public safety issues.

4 Case Study

4.1 Describe the selected case

Considering the importance of big data in public safety governance, this study chooses “Traffic management system of City A” as a case for analysis. City A has seen a 30 percent increase in traffic accidents and a 45 percent increase in traffic delays in recent years. To address these challenges, the city government has introduced big data technology.

4.2 Analyze the role and interaction of governance subjects in the case

In this case, there are multiple governance agents:

Decision makers: A The city government, which is responsible for formulating traffic management policies and programs.

Executors: Traffic police departments, responsible for implementing government policies and managing traffic.

Analyst: Company B, a technology company that provides data collection, analysis and forecasting services to the municipal government, develops an Intelligent transportation system (ITS), which has achieved an accuracy rate of 85 percent

Information provider: The public and various sensors, such as traffic cameras, GPS, etc., provide real-time traffic data.

Thanks to this highly accurate forecasting, City A has seen an 18 percent reduction in traffic accidents and a 25 percent reduction in traffic delays over the past year.

4.3 Analyze the specific events in the case in detail

(1) Traffic congestion prediction

Event Description: On A particular Friday afternoon, Company B predicted that downtown A would have severe traffic congestion by

early evening. The forecast showed that traffic could increase by as much as 40%.

Interactive analysis: Company B promptly informed the city and the traffic police department. The city government then issued an announcement advising citizens to try to avoid driving into the city center during the predicted time period and to consider using public transportation. The traffic police department stepped up patrols of key roads and was ready to take necessary traffic control measures.

(2) Traffic accident response

Incident Description: A major traffic accident occurred on a major highway in the city of A, involving 5 vehicles. Company B's forecast indicates that this could cause traffic delays of at least 2 hours.

Interactive analysis: Through traffic cameras and mobile app reports from the public, accident information is quickly conveyed to Company B and the traffic police department. Company B uses big data analysis to predict the traffic impact an accident may cause and provide detour advice. The traffic police department quickly dispatched rescue teams and adjusted the flow of traffic on other sections of road based on Company B's analysis.

4.4 Insights on big data, governing bodies and correlations extracted from the case

Real-time and accurate data: In the case of City A, real-time and accurate data is essential for traffic management. Any delay or error in data can lead to traffic accidents or congestion.

Cooperation and interaction of governance bodies: Big data makes the interaction between governance bodies more frequent and closer. In this case, there is daily communication and cooperation between the municipal government, the traffic police and Company B.

Participation of the public: In the context of big data, the public is not only a provider of data, but can also become a participant in decision-making.

4.5 Overall evaluation of the case

The traffic management system in City A has successfully demonstrated how big data can help the city deal with traffic challenges and promote close cooperation between different governance bodies. But it has also brought new challenges, such as how to ensure the privacy protection of data and how to ensure the synchronization of information between different governance entities.

5 Conclusions and recommendations

5.1 Summarize the main findings of the study

This study explores the application of big data in public safety governance, especially the role and interaction of governance agents. Key findings include:

1. Impact of big data: Big data provides more real-time, accurate and comprehensive information for public security governance, which helps to improve the efficiency and effect of decision-making.

2. Change of governance subjects: In the context of big data, the subjects of public security governance not only include traditional government departments and law enforcement agencies, but also involve technology companies, data providers and the public.

3. Interaction among subjects: Big data promotes closer interaction among governance subjects, but at the same time brings new challenges, such as data ownership and access rights.

5.2 Suggestions on public security governance in the context of big data

1. Strengthen data management

Specific measures: Establish and maintain a centralized data storage and management system to ensure data integrity and security.

Implementation suggestion: The government can cooperate with professional technology companies to make use of advanced data encryption and backup technology to ensure data security.

2 Promote cross-departmental cooperation

Specific measures: Establish a cross-departmental data sharing and cooperation platform to encourage information exchange between different departments.

Implementation suggestions: Cross-departmental meetings can be held regularly to discuss the application of data and the direction of cooperation.

3. Strengthen public participation

Specific measures: Provide training and education on public data, and establish a mechanism for reporting and feedback on public data.

Implementation suggestion: The government can cooperate with educational institutions and community organizations to carry out public data education activities.

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