A Review of Domestic Open Government Data Policy Research: Postprint

Authors: Wen Fangfang, Chang Dawei, Ji Yixin

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Abstract

[Purpose/Significance] Policy constitutes a crucial element within the open government data ecosystem. This study reviews and critiques research findings on open government data policies, aiming to provide policy proposals for formulating China's open government data policies while offering references and guidance for in-depth policy research. [Method/Process] Employing the literature survey method, this paper systematically reviews and synthesizes research related to open government data policies, upon which it conducts a comprehensive evaluation of existing research and proposes future research directions. [Results/Conclusion] The findings indicate that current research on China's open government data policies primarily concentrates on three dimensions: the open data policy environment, policy formulation, and policy implementation. Specific limitations of extant research manifest as: an emphasis on foreign empirical studies with insufficient attention to China's own policies; research that is fragmented and abstract, lacking systematic and concrete analysis. Future research should delve into the open data policy content system, particularly data asset management policies, coordination mechanisms for policy implementation, participation and supervision mechanisms, as well as the adaptability of existing policies.

Full Text

Preamble

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A Review of Research on Open Government Data Policies in China

Wen Fangfang[1], Chang Dawei[1], Ji Yixin[2]
[1]School of Information Management, Wuhan University, Wuhan 430072
[2]Shanghai Jiao Tong University Library, Shanghai 200240

Abstract

[**Purpose/Significance**] Policy is a crucial element in the open government data ecosystem. This paper reviews research on open government data policies to provide policy options for China's open government data policy formulation and to offer references and guidelines for in-depth policy research. [**Method/Process**] Using literature review methods, we systematically 梳理 and summarize research related to open government data policies, comprehensively evaluate existing studies, and propose future research directions. [**Results/Conclusions**] Research shows that current studies on China's open government data policies focus on three areas: the policy environment for open data, policy formulation, and policy implementation. Existing research limitations include: an emphasis on foreign empirical studies with insufficient research on domestic policies; fragmented and abstract research lacking systematic and concrete analysis. Future research should conduct in-depth investigations into the open data policy content system, particularly data asset management policies, coordination mechanisms for policy implementation, participation mechanisms, supervision mechanisms, and the adaptability of existing policies.

Keywords: open data; open government data; policy research; literature review

1. Introduction

In 2009, the Obama administration issued the *Open Government Directive*, launching the global open government data movement. An increasing number of countries and intergovernmental organizations have joined open government initiatives and promoted open data through policy formulation. In 2015, China issued the *Outline for Promoting Big Data Development* (hereinafter referred to as the *Outline*), elevating government data openness and sharing to a national strategy and requiring the formation of a "legal and policy system for reasonable opening and sharing of public data resources" within 5-10 years [1]. As a vital element in the open government data ecosystem, policy has attracted early attention from government departments and academia in China.

Scientific research requires periodic review to provide references and guidance for deeper exploration. Existing literature includes overall summaries of open government data research [2-6], which touch upon policy studies but with limited depth. Other research focuses on specific aspects such as linked open government data [7], metadata standards [8], and open government data evaluation [9]. Although Ma Haiqun et al. [10] analyzed the status of open data policy research at home and abroad, their study was published before the *Outline* and thus reflects limited research on open government data policies. With the release of the *Outline*, large-scale open government data initiatives began, and research on open data policies truly commenced. To comprehensively grasp current research hotspots and gaps, this paper analyzes studies on China's open government data policies, 梳理 main research topics, and identifies shortcomings and future

directions.

Using the CNKI full-text database, we employed the search query SU=("open government data" OR "government data openness" OR "government open data") AND ("policy" OR "strategy"), limited to journal articles, conference papers, and dissertations, yielding 123 documents (search date: June 7, 2018). After removing irrelevant literature, 97 documents were selected for analysis. The earliest policy research dates to 2013. Following the *Outline*'s release, the number of papers on open government data policies grew significantly, with over 70% published in 2016 and 2017 alone [Figure 1: see original paper].

Content analysis enables relatively systematic and comprehensive summarization of an entire dataset [11]. This study adopts qualitative content analysis to cluster research content and systematize classification. The coding system was established based on grounded theory, refining research content into data units to form a hierarchical thematic classification. Open government data policy research topics were summarized into three major categories: open government data policy environment, open government data policy formulation, and open government data policy implementation.

2. Open Government Data Policy Environment

Public policy agenda-setting, formulation, and implementation are closely related to the policy environment. Internationally, most countries' open government data strategies are not formulated overnight but require institutional conditions and socio-cultural support [12]. Zhao Rundian, Ma Haiqun, and Pan Pan [13-15] argue that open government data policy formulation and implementation are influenced by natural geography, society, politics, law, economy, technology, international cyberspace, and other countries' open data practices, providing systematic analysis of these factors. Although China possesses a solid foundation for implementing open government data strategies and society's demand for data-driven innovation and economic development is strong [12], there remains a significant gap between public information resources (in terms of quantity, quality, and timeliness) and social demand due to poor information resource foundations, low digitalization levels, inadequate legal systems, and insufficient innovation capacity [12, 16]. Despite these unfavorable factors, China's open data policy environment has taken shape, providing conditions and foundations for policy agenda-setting, problem definition, and policy formulation.

Since the external environment for open data policies is constantly evolving, Chen Mei argues that policies must be revised in response to environmental changes and deepening understanding among policymakers to prevent premature policy termination while maintaining policy coherence [17]. Open data policies are products of their environment. China's open data policy environment includes both favorable conditions and constraints, encompassing both internal and external factors. Current research analyzing China's open data policy environment remains limited. Only Zhao Rundian and Ma Haiqun [13-14] have

specifically analyzed the social, economic, and political policy environment for government open data, with the latter comprehensively examining favorable conditions and constraints. Similar to Zhao Rundian, Pan Pan et al. [15] also analyzed internal and external environments for open data, but with the notable difference of adopting a global perspective to recognize international political and economic order, major power relations, and international cyberspace impacts, revealing the specific content and interrelationships of environmental systems and political interactions. Across these three themes, research on the policy environment, though limited in quantity, demonstrates relatively concrete analysis that continues to deepen and broaden.

3. Open Government Data Policy Formulation

Western countries' government data openness fundamentally follows a top-down policy approach, relying on policy continuity to promote and drive government data opening [18]. In contrast, China's open data policy construction remains inadequate and lagging [19-21]. Existing research has conducted content analysis of national and local government data openness and sharing policies, finding that apart from the national big data strategy, China lacks dedicated government data openness and sharing policies, with relevant policy content being fragmented and lacking systematicity [22]. Local government policies exhibit "mismatch" between policy tools and objectives [23]. Uncoordinated open data efforts across government levels and lack of unified standards have resulted in slow open data progress in many local governments [18], seriously hindering China's open data advancement [21]. Therefore, a clear, hierarchical, and practical policy system urgently needs to form under the guidance of the national big data strategy [22].

Domestic open government data policy research focuses on top-level design from the national level, establishing open government data policy frameworks and systems. Zhao Rundian [13, 24] constructed an open data policy framework covering policy objectives, institutional setup and personnel coordination, data management, policy implementation plans, and policy evaluation strategies. Chen Mei argues that China's open data policy content should include open data policy objectives and data management [21]. Huang Ruhua et al. extracted a policy framework from dispersed policy texts encompassing data management across the data lifecycle, data quality, infrastructure, privacy, and data security [22], further establishing policy issues [25] to lay foundations for policy system formation.

Beyond policy frameworks, many studies address open data principles, data and metadata, data management, and data security and privacy.

3.1 Open Government Data Principles

Internationally, open data principles provide basic standards and requirements for open government data. The *Eight Principles of Open Government Data*

(2007) serves as a pioneering open data guide, forming the basis for open data principles and policies in numerous countries and local governments. Additionally, the *Open Data Charter* has made "open by default" a consensus among G8 members. Sun Yanyan et al. [26] advocate that China should adopt "openness" as the default principle, maximizing the opening of government-held data except for data involving national security and personal privacy. Based on analysis of international open data principles, Jiao Haiyang proposes [27] that Chinese government data openness should follow principles of openness, quality, timeliness, equality, interest balance, and security.

The author believes that open government data principles constitute the general charter and behavioral rules for government data opening. The UK has seen considerable discussion and evolution of its relevant policies, primarily because principles largely determine development directions. In China, principles often remain broad and lack substantive content. Therefore, China should align with international standards as much as possible, establishing specific open government data principles under the premise of following international norms, and use these as the foundation and overarching framework for further establishing a systematic and concrete open government data policy system.

3.2 Open Data and Metadata

In countries and regions with advanced information infrastructure, open data strategies have more solid implementation foundations and better execution [12]. Data and metadata are fundamental to data openness and sharing. The *Big Data White Paper* (2016) notes that China's government data openness lacks a solid data foundation [28]. Current research focuses on data format and quality and metadata issues.

3.2.1 Data Format and Quality Open data requires government departments to publish data in non-proprietary, machine-processable formats to the greatest extent possible. Since open data consumers include both ordinary users and data development companies, open data should also be as diverse as possible. However, in reality, datasets published in China have relatively single formats [20] and insufficient standardization [12], with data heterogeneity hindering interoperability. Moreover, data format openness is closely related to data quality [29], and the lack of institutional standards for open data formats, quality, and data interoperability constrains the implementation and value transformation of open data strategies [30]. Therefore, Ma Haiqun et al. [14] identify the core task of open data strategy as publishing and opening high-quality government data. Existing research suggests improvements in the following areas:

1. Formulate and follow unified standard formats, using open standard formats [23, 29, 31] and providing multiple open formats where possible [32];

2. Enhance data structure extensibility and information system architecture interoperability [33];

3. Establish legal and standard systems related to open government data quality [34-35].

3.2.2 Metadata Metadata enhances understanding and reuse of datasets. However, China currently lacks a unified metadata standard [21-22, 32]. Inconsistent metadata standards prevent the achievement of data openness and sharing objectives [25]. Therefore, open government data metadata standards have become a research focus. These studies primarily analyze metadata standards adopted by major countries (e.g., UK, US, Australia) and propose metadata solutions for China [32, 36-39].

Regarding metadata standard systems, scholars suggest drawing on international generic metadata standards [32] while developing domain-specific metadata standards [37]. Chen Tao et al. propose [40] that the metadata specification system should include metadata standard library construction and dataset usage specifications, with specific content including establishing reference data dictionaries and modifying international metadata standard element types and syntax rules according to actual needs.

For metadata interoperability, Huang Ruhua et al. argue [32] that since most international metadata standards are developed based on the DC metadata standard, China needs to develop metadata standards compatible with DC. Additionally, mapping metadata to standard vocabularies is an effective method for enhancing metadata interoperability [32, 41]. Regarding metadata standard formulation, Zhao Rongying et al. [36] analyzed the UK's metadata standards, noting that standard development requires clarifying open data website objectives and data types, analyzing and comparing structural, attribute, and value characteristics, and establishing data dictionaries for reference.

Notably, domestic scholars rarely explore how to ensure open government data quality. While data quality is not a new concept, open government data necessarily endows it with new connotations. Beyond ensuring basic attributes such as accuracy, completeness, and timeliness, open data must also be machine-readable, machine-processable, and openly accessible. As a top priority for open data, data quality's impact on implementation effectiveness is self-evident and deserves in-depth exploration by theorists and practitioners. Regarding metadata, scholars represented by Zhai Jun and Huang Ruhua have proposed general metadata standard solutions based on foreign case studies, but establishing an appropriate metadata standard system remains a key challenge.

3.3 Government Data Management

Although open government data emphasizes "openness," it must be based on solid data management covering data collection, processing, preservation, and

utilization. Government data management directly affects open government data effectiveness [42]. Theoretically, consensus has initially formed on lifecycle-based open government data management [25]. Scholars have also attempted to construct unified government data management systems at the policy level to standardize activities across the open data lifecycle. Existing research focuses on data processing, data publication, cross-departmental sharing, and data acquisition and utilization.

3.3.1 Data Processing China has not formed a hierarchical data classification system or systematic data description, resulting in unstandardized organization and processing of published datasets [21]. Therefore, relevant studies [13, 21] recommend standardizing open directories and thematic classifications on government portal websites, clarifying specific government data classification standards, clearly defining data levels, and protecting sensitive data involving state secrets, business secrets, and personal privacy. Regarding data description, Huang Ruhua et al. [43] surveyed open government data description specifications in major countries, analyzing metadata elements, semantic structures, formats, and syntax, and recommended that China's open data description specifications adopt international generic standards, compile controlled vocabularies adapted to network characteristics, unify metadata formats, and develop metadata element set drafts.

Linked data, based on standardized formats and interfaces using RDF series standards for data exchange and query, has become the foundation for publishing, sharing, and connecting data on the Internet. Since linked data provides a simplified semantic description framework for government data organization [44], scholars recommend adopting linked data-related standards to promote open government data. Lv Yuanzhi [44] constructed a semantic "linking" organization hierarchy model for e-government information resources, proposing implementation steps for semantic organization and discussing issues such as identifier uniqueness and data integration. Zhao Longwen argues [45] that besides describing dataset information, relationships with other datasets should also be described, and proposes suggestions for developing description frameworks.

Open data is carried through directories. Regarding directory construction, Yu Mengyue et al. recommend building a public information resource open directory system centered on metadata and establishing aggregation and coordination mechanisms among data directories at various levels [38].

3.3.2 Data Publication "Compiling a complete inventory of government-held data and prioritizing the opening of important foundational data" is one of the primary tasks in open data policy formulation and implementation [46]. Research on government data publication focuses on the scope and prioritization of open data. Regarding scope, scholars recommend:

1. Defining open data scope, clarifying which data can be opened and which

should be protected [21, 31, 47];

2. Processing and opening general data promptly, while separating sensitive data for opening after desensitization [21];

3. Providing reasonable "exception" explanations for non-open content [47];

4. In prioritization, besides giving priority to data closely related to public welfare or livelihood issues [40, 48-49], consideration should also be given to different agencies' data opening foundations. For example, Chen Tao et al. recommend [40] that agencies with good open data foundations should implement priority opening and propose specific implementation steps.

3.3.3 Cross-Departmental Data Sharing Due to interest conflicts among different departments [21] and lack of unified standards and policies resulting from different functions [40], cross-departmental data sharing faces significant challenges. Huang Ruhua and Si Linbo et al. [21, 49] recommend establishing cross-agency management departments to coordinate data openness across different departments, supervise data processing and quality, and ensure low redundancy in agency open data to enhance collaborative service capabilities. Li Min [47] recommends developing minimum dataset sharing standards to provide a basis for government data sharing metadata. Wang Fang et al. [50] address China's imperfect data sharing policies by recommending improvements to data security policies, accelerating technical standard system construction for data cataloging management and sharing platform development, establishing data management mechanisms, and formulating data sharing management measures.

3.3.4 Data Acquisition Open government data safeguards citizens' right to know and requires proactive data provision. However, current government information disclosure laws impose overly strict conditions on citizens' free access to public information [51], limiting freedom to obtain government data. Many scholars advocate appropriate adjustments and revisions to information disclosure laws [52] to reduce excessive restrictions on public information freedom and continuously improve classification and declassification procedures [53]. For example, Tan Haibo et al. [52] recommend revising the *Regulations on Government Information Disclosure*, developing exemption clauses for special circumstances in data openness, and clarifying user rights and obligations.

Currently, many government data still lack convenient acquisition channels [54]. Since data is typically published on open data platforms or websites, scholars propose the following policy solutions:

1. Strengthening website system construction, institutionalizing, standardizing, and proceduralizing all aspects of construction, management, and maintenance [55];

2. Legally regulating services provided by open data platforms, including data retrieval, downloading, subscription, and related applications [35];

3. Standardizing open data directory architecture and thematic classification, and compiling open data directories under policy guidance [31, 56].

3.3.5 Data Reuse The true value of open government data lies in releasing data dividends and maximizing value-added through data reuse [30]. However, China's policies on data development and utilization remain inadequate [18, 51], with existing research focusing on the big data industry, data transaction and pricing strategies, and open licensing.

Regarding the big data industry, scholars recommend:

1. Government encouragement of data industry development [14] and designing industrial policy systems for open data reuse [12];

2. Formulating supporting policies to incentivize big data innovation and entrepreneurship [57];

3. Strengthening market supervision, lowering market entry barriers, and encouraging participation by small and medium-sized enterprises and the public [16, 58].

Regarding data transactions, research emphasizes establishing data transaction rules and cost-benefit evaluation standards [19, 47]. While some domestic scholars advocate combined free and paid pricing strategies [35, 47, 48], considerable debate exists. Li Min [47] argues that government should strictly distinguish between "public welfare services" and "market competition," mandating marginal-cost sharing for public welfare information while incorporating investment data from non-governmental organizations into market operations. Wang Xiaoyu [59] advocates cost-based fees for profitable government information while minimizing or eliminating fees for non-profit information. Yang Dongmou et al. [53] recommend adhering to the principle of free use, with flexible and appropriate policies for the few cases where fees might be required. Tian Dazhi [60], from a copyright management perspective, suggests reasonable pricing through government price limits or guidance based on marginal costs and differential pricing.

Only data authorized under certain agreements can be used [61]. From local government open data practices, various regions currently adopt website disclaimer terms/user agreements for overall authorization of published open data [54] but lack clear open licenses [12, 62], which does not comply with the legal openness principle of open data [54]. Consequently, many scholars recommend developing open data license agreements or authorization mechanisms suitable for China's national conditions [31, 53-54, 61, 63] to promote government data acquisition and reuse. Huang Ruhua et al. [62] investigated foreign open gov-

ernment data license agreements, analyzed the feasibility of adopting Creative Commons (CC) licenses for China's data openness, and recommended using CC to support China's data opening.

Overall, open government data management policy research covers data processing, publication, cross-departmental sharing, data acquisition, and reuse. Currently, no discussions or solutions address data production or creation, and research has not involved data archiving and preservation. Meanwhile, data acquisition policies mainly focus on exploring the adaptability of the *Information Disclosure Regulations*, with research on website accessibility acquisition policies remaining rudimentary. Data reuse discussions primarily revolve around whether to adopt free or paid models and which open licenses to use. This suggests that academia primarily focuses on data description and opening as policy priorities. As research deepens, scholars' attention will likely shift toward weaker research areas such as data archiving and preservation and data acquisition.

3.4 Data Security and Personal Privacy

Open data conflicts with national data security and personal privacy in terms of values and interests [25]. The UK and US have adopted approaches of revising existing information laws or formulating new data protection laws to provide legal guarantees for secure data use [20]. China's existing laws have gaps in personal data protection and data security [12, 20]. Given threats to data security from open data, China has concentrated on releasing laws and policies on network and information security since 2016, with many academic studies addressing these issues but few offering pragmatic policy solutions.

Current research focuses on protecting personal privacy while opening data, proposing policy solutions including:

1. Formulating personal privacy protection laws or personal information protection laws with clear provisions on legal concepts, protection scope, and relief methods [51, 64-66]. Zhang Xiaojuan et al. [65] recommend that governments filter data before opening, propose three basic principles for personal information protection, and establish citizen supervision and relief systems.

2. Conducting privacy analysis reviews and privacy impact assessments. Huang Ruhua and Li Nan [66] advocate choosing not to disclose personal data when opening data or desensitizing sensitive data without substantially compromising original data integrity, establishing privacy analysis and review mechanisms across the entire data lifecycle, and conducting privacy impact assessments.

3. Establishing data classification. Cai Jingxuan et al. [67] recommend learning from the US data security classification system to classify

government data by importance level for targeted protection.

4. Standardizing data collection, sharing, and use behaviors [49, 52, 66]. Huang Yuting et al. [49] conduct in-depth discussions on specific issues involving data collection and use in personal data security legislation.

5. Implementing risk assessments for government open data. Since open data involves personal privacy, business secrets, and national information security, Wang Fang et al. [19] recommend conducting risk assessments for different types of government data openness and utilization and developing reasonable risk prevention strategies.

In the absence of relevant higher-level legal guidance, a "release first, regulate later" approach is undoubtedly advisable. This means temporarily avoiding overly restrictive legal provisions and instead protecting data privacy from policy, technology, industry self-discipline, and application packaging perspectives [18].

4. Open Government Data Policy Implementation

Policy implementation is the process by which public departments transform policy content into reality after completing policy formulation. The process mainly includes policy promotion, policy decomposition, material preparation, organizational preparation, policy experimentation, full implementation, and coordination and monitoring [68].

4.1 Policy Decomposition: Implementation Plans

Policy decomposition involves developing implementation plans that break down overall policy objectives into sub-objectives to facilitate gradual progress. Open government data partnerships require member countries to develop national action plans to promote the open government data movement. Many domestic scholars recommend formulating overall development plans and action plans to open government data systematically and step-by-step. Chen Tao et al. recommend [40] that overall development plans must be formulated under national strategic guidance with unified deployment to avoid redundant construction. Sun Yanyan and Zhou Wenhong et al. [26, 69] argue that China's open government data needs to establish strategic objectives and specific action plans tailored to national conditions. Additionally, relevant research recommends setting phased objectives and plans to open government data step-by-step [49].

The arduous and complex nature of open data tasks requires clear planning to ensure phased and step-by-step implementation. Such planning must be goal-oriented, establish open data action timetables, distinguish priorities, advance gradually, and continuously expand data openness. Although China has formulated a big data strategy, it lacks detailed implementation plans for open government data, warranting in-depth discussion by academia and industry.

4.2 Organizational Preparation: Institutions and Personnel

Open government data policy implementation requires sound organizational institutions, competent leaders, and policy implementers. Relevant research therefore focuses on establishing institutions and equipping and cultivating policy implementers.

4.2.1 Policy Implementation Institutions Worldwide open government data strategic implementation leadership structures fall into three types: centralized, decentralized, and single-agency-led [12]. To promote China's open government data, scholars recommend establishing policy implementation institutions, including specialized government data management agencies [13, 70] and multi-stakeholder open data working groups [23, 71]. These institutions must clarify organizational functions and position responsibilities to ensure specific operation and implementation of open government data guarantee mechanisms [70], such as formulating open data standards, data management systems, and effective data collection measures [40], and being responsible for guiding, coordinating, and supervising open data work [20, 52].

4.2.2 Policy Implementers and Their Competencies First, government leaders' concepts are important factors in open government data [30]. Most countries' open government data strategy launches have received strong support from political leaders and top executives [12]. Therefore, some scholars believe political leaders' support and attention are key to open data success [12, 17]. Second, Chief Information Officers should be established [20, 52, 72] with professional data management and technical personnel [70]. Addressing the shortage of outstanding talents in government open data and big data analytics management, researchers propose talent introduction and cultivation measures [73], such as incorporating big data analytics technologies into current educational curricula [73], promoting cooperation between government departments and universities to cultivate data analytics experts [73], establishing multi-level and multi-type talent cultivation mechanisms [21, 73], and regularly providing data business skills and knowledge training for leading cadres, data analysts, and managers [72-73]. Finally, the public is also an extremely important policy implementer. To improve public competence, Huang Yuting et al. [49] recommend providing paid or unpaid guidance to the public while conducting open data promotion and basic knowledge popularization across society.

In fact, to promote the national big data development strategy, the State Council established an inter-ministerial joint meeting system led by the National Development and Reform Commission to strengthen data resource coordination management, and many local governments have established dedicated data management bureaus. Open government data has also received strong support from national leaders. However, talent cultivation and public data literacy formation cannot be achieved overnight. Questions regarding what competencies open government data professionals should possess, how talent cultivation mechanisms

should operate, and how public data literacy can be formed urgently require clarification by national authorities.

4.3 Coordination and Control Mechanisms

Open government data involves many stakeholders, including government departments with different functions and levels, private institutions, social organizations, and individuals. Corresponding coordination and control mechanisms must be in place to clarify rights and responsibilities, balance interests, and achieve comprehensive coordination. Currently, unclear rights and responsibilities of open data subjects and lack of effective cross-departmental collaboration mechanisms result in insufficient motivation for inter-departmental data sharing [21]. To address unclear open data rights and responsibilities, scholars recommend:

1. Establishing clear open data functional departments responsible for overall planning and coordination of human, financial, and material resources [12, 26, 72] to achieve horizontal and vertical government coordination [29];

2. Clarifying rights and responsibilities of open data subjects (or stakeholders) in data collection, storage, and utilization [3, 19, 55];

3. Establishing open data accountability mechanisms [3, 59]. For example, Wang Xiaoyu [59] proposes that citizens or enterprises can report and appeal government illegal or irregular behaviors in open data processes, recommending clear conditions and procedures for accountability.

Open government data involves stakeholders including government, data developers, enterprises, and ordinary citizens. How to motivate participation from all parties while balancing interests is a key issue policymakers must consider. Although existing research recognizes the government's role in coordinating various parties and the importance of clarifying stakeholder responsibilities in open data activities, no clear coordination mechanisms have been proposed.

4.4 Participation and Interaction Mechanisms

Participation is an important principle of open government and a crucial path to achieving government transparency. In the open data context, many countries encourage public participation in open data promotion and value-added utilization, forming effective feedback mechanisms [20]. Currently, China's existing open data platforms have low public participation [74] and lack convenient, timely, effective, and open interactive communication [54].

Therefore, relevant research recommends granting the public more administrative participation rights [75], not only allowing public participation in policy decision-making [76] but also encouraging ordinary citizens, enterprises, and social organizations to participate in data development and reuse [21, 26, 72].

Collaboration is an extension of participation. Users are not only consumers of data products and services but can also become active contributors to open government data, providing suggestions for government data openness and sharing [25]. Influential open data countries actively cooperate with social organizations in technology and personnel, with cooperation covering every aspect of the open data process [12]. Consequently, research recommends that government proactively conduct multi-level and multi-type cooperation with the public. Xia Yijian [12] suggests strengthening cooperation with the private sector through conferences (forums) and dialogue mechanisms. Wang Fashuo et al. [30] recommend that government cooperate with big data leading enterprises in the initial stage of open data, using successful project demonstrations to expand the breadth and depth of open data.

Research also focuses on establishing reasonable user participation mechanisms. Chen Tao et al. [40] argue that interaction mechanisms with users should include both user-to-user interaction and interaction between users and government agencies or open data platforms. By utilizing portal websites and Web 2.0 technologies (such as government blogs and microblogs), governments can obtain public suggestions and feedback to provide data meeting user needs and continuously improve data service quality [21, 40, 72]. Tang Zhiwei et al. [76] find that China lacks demand-side policy tools and needs to formulate more demand-side policies, such as establishing incentive measures to recognize and reward the public for innovative services or technologies based on government data, thereby enhancing social demand.

The author believes that participation and interaction largely depend on: first, citizens' political participation awareness. Although democratic politics in China has made great progress, public participation in government governance remains weak, and a culture of universal participation has not formed. Second, open data demand motivation. Only public demand can guide the scope of open data and influence the degree of openness. Third, public capacity to utilize open data. Even with data demand, actual data capabilities may be insufficient to support utilization, preventing positive interaction. Addressing these three aspects could foster good public participation and government-citizen interaction.

4.5 Supervision and Evaluation Mechanisms

Open government data policy implementation requires establishing corresponding supervision mechanisms and accountability systems to ensure data openness effectiveness and timeliness [20, 59]. Countries with high data openness have initially established government data openness inspection and evaluation systems [12]. For China's open data implementation supervision, researchers [35, 55, 59] recommend supervision by government internal bodies such as people's congresses, administrative organs, and judiciary, as well as social supervision by enterprises and media and third-party oversight. Supervision content includes monitoring open data work of governments and institutions at all levels,

reviewing data openness and updates, accepting complaints, and completing investigation and handling within specified timeframes [31, 40].

Performance evaluation assesses the actual effectiveness of open government data. Tang Zhiwei et al. [76] recommend incorporating open government data levels as government assessment indicators. Wei Liurong [16] proposes an evaluation mechanism combining self-assessment of public information resource sharing, assessment by competent departments, and social evaluation, requiring each open information department to publish annual work reports, with competent departments supervising and assessing implementation according to open plans and regularly organizing social evaluations. Evaluation results should be linked to corresponding incentive and accountability systems. For example, Sun Yanyan et al. [26] recommend regularly publishing open data survey reports for each region and government agency, with administrative inaction penalties for non-compliance.

Supervision and evaluation can subject open government data actors to oversight and constraints from government regulatory departments, third-party institutions, and society, ensuring conscious fulfillment of responsibilities according to policy requirements and representing important means to ensure effective policy implementation. Current research offers many constructive suggestions that can be further refined to clarify qualifications and responsibilities of supervisors and evaluators, as well as supervision and evaluation content and methods.

5. Summary and Outlook

5.1 Summary

Reviewing research on China's open government data policies, particularly since the release of the national big data strategy, policy research has received high attention from academia and government departments, yielding numerous research 成果. Through systematic 梳理 and summarization, these 成果 concentrate on three areas: open government data policy environment research, open government data policy formulation, and open government data policy implementation. Overall, China's open government data policy research is experiencing a shift from macro to micro perspectives and from foreign experience 借鉴 to domestic policy practice.

However, existing research still has many shortcomings: first, an emphasis on foreign experience research with insufficient research on domestic policies. Compared with Europe and the US, China's open data remains in the exploration stage, leading many scholars to conduct case analyses of typical countries' policies. As domestic open data advances, some scholars have studied national and local government policies, but no consensus has formed on what policy system China should establish. Second, research is fragmented and abstract, lacking systematic and concrete analysis. Since most studies analyze certain national policies and address many aspects of policy issues but not in depth, policy recommendations for China remain fragmented and lack systematicity. Additionally,

constrained by conventional thinking, most policy proposals are broad and not specific, offering relatively weak reference significance and practical impact for policymakers.

5.2 Future Research Outlook

Based on the above analysis, the author believes current research should conduct targeted and systematic studies on open data policies in combination with China's actual conditions. Many issues in China's open government data policies require resolution, such as unclear open data principles, unclear government data management approaches, and imperfect policy implementation mechanisms, all requiring continuous deepening and expansion.

5.2.1 Policy Content System Policy formulation is key to open data implementation. China urgently needs to establish a comprehensive policy system to promote open government data. Therefore, policy analysis research should serve government decision-making and provide practical solutions for policy formulation. Since existing research emphasizes experience 借鉴 with limited involvement in what policy system China should establish, there is no clear 思路 on crucial policy components such as metadata standards, data asset management, personal privacy, data rights, and user rights. Consequently, in-depth exploration is needed regarding metadata, data asset management, data security and privacy, data rights, and user participation in open government data.

5.2.2 Policy Implementation Mechanisms Regarding policy implementation research, academia has largely reached consensus, mostly advocating for open data implementation plans, organizational setup, personnel allocation, and establishment of coordination, participation, and supervision mechanisms. However, much research remains at the conceptual level without further in-depth investigation. Therefore, specific research and scientific deployment are needed to design open data implementation plans, explore organizational and personnel arrangements suitable for China's national conditions, and develop coordination control mechanisms, participation interaction mechanisms, and supervision evaluation mechanisms.

5.2.3 Adaptability of Existing Policies Open government data inherits from and develops upon government information disclosure. Typical open government data countries have formed relatively complete metadata standards, information lifecycle management policies, public information reuse policies, licensing policies, and personal data protection policies during the government information disclosure stage. With changes in the new open data environment, these countries have timely revised their corresponding policies. In contrast, China's policy foundation is weak, so besides formulating supporting policies as soon as possible, existing policies also need review, assessment, and timely revision to enhance their adaptability.

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Author Contributions:
Wen Fangfang: Designed the topic, determined research methods, wrote and revised the paper;
Chang Dawei: Provided paper revision suggestions;
Ji Yixin: Proofread and supplemented references.

Note: Figure translations are in progress. See original paper for figures.