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Public Participation Models in Open Government Data: Theoretical Construction and Empirical Case Study Postprint

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Abstract

[Purpose/Significance] This study explores theoretical models of public participation in government data openness, aiming to guide government departments in effectively achieving policy objectives for public participation in data openness and advancing research on public participation in government data openness. [Method/Process] Employing literature analysis, logical analysis, and case analysis methods, and utilizing the ladder theory of public participation as an analytical tool, this research constructs and empirically validates models of public participation in government data openness. [Results/Conclusions] Public participation in government data openness can be theoretically constructed into four models: informational participation, consultative participation, collaborative participation, and empowerment participation, with core meanings respectively being government conveying information to the public, government consulting public opinion, equal cooperation between government and the public, and co-governance between government and the public. On the one hand, these four theoretical models of public participation in government data openness exhibit distinct characteristic differences in terms of government intention, dominant force, information flow, public information awareness, and degree of public autonomy; on the other hand, they receive strong empirical support from domestic and international practice cases of public participation in government data openness.

Full Text

Preamble

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Public Participation Models in Government Data Openness: Theoretical Construction and Case Empirical Analysis

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Abstract:

[Purpose/Significance] This paper explores the theoretical models of public participation in government data openness, aiming to guide government departments in effectively achieving policy objectives related to public participation in data openness and to advance research on this topic. [Method/Process] Using literature analysis, logical analysis, and case analysis methods, and employing the public participation ladder theory as an analytical tool, this study constructs and empirically validates public participation models in government data openness. [Result/Conclusion] Public participation in government data openness can be theoretically constructed into four models: informative participation, consultative participation, cooperative participation, and authorized participation. Their core meanings are respectively: government communication of information to the public, government consultation of public opinions, equal cooperation between government and the public, and joint governance by government and the public. These four theoretical models of public participation in government data openness exhibit clear differences in terms of government intention, dominant force, information flow, public information awareness, and degree of public autonomy, while simultaneously receiving strong empirical support from domestic and international practices of public participation in government data openness.

Keywords: Government Data Openness; Public Participation; Public Participation Ladder Theory; Theoretical Model

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1. Problem Statement

Since the Obama administration established participation as a fundamental principle of the “Open Government Initiative” in 2009, public participation has been widely emphasized by governments worldwide as an important approach to promoting the global government data openness movement. After proposing the goal of “establishing a transparent, participatory, and collaborative institutional system” in the *Memorandum on Transparency and Open Government* [1], the United States further advocated in its *Open Data Action Plan* that government should “collaborate with social forces to set priorities for open dataset releases, while paying greater attention to social feedback to improve service levels” [2]. The UK’s *Open Government National Action Plan* and *Open Government Partnership: UK National Action Plan 2013* subsequently put forward requirements such as “encouraging citizens to actively participate in government construction,

promoting reform, and stimulating innovation” [3] and “cooperating with civil society organizations to identify high-value datasets across multiple fields, and actively encouraging social organizations to utilize open data to create economic value” [4]. China’s *Outline for Promoting Big Data Development* also clearly states: “Encourage cooperation between government and enterprises and social institutions, and through various means such as government procurement, service outsourcing, and social crowdsourcing, rely on professional enterprises to carry out government big data applications, thereby reducing social governance costs” [5]. Meanwhile, numerous practical cases of public participation in government data openness have emerged worldwide, including representative examples such as the U.S. public-private partnership in developing data platform APIs, the UK’s Open Data Dialogue, Australia’s government data openness inventory and reports, Singapore’s government network platform information feedback mechanism, China’s Shanghai “SODA” Open Data Innovation Application Competition, Guangdong’s government procurement of data openness services, and Haikou’s police-enterprise cooperation in releasing traffic data. Against this backdrop, exploring the theoretical models of public participation in government data openness and analyzing the different forms and attributes of public participation constitute an important research topic for guiding government departments in responding to and achieving the policy objectives of public participation in data openness.

Current systematic research on public participation in government data openness remains limited in academia, with most studies embedding discussions of participation subjects, values, approaches, problems, and countermeasures within broader topics related to government data openness. Existing research can be broadly categorized into four aspects: (1) **Value and significance of public participation.** Scholars have summarized the utility of public participation for both government and the public from political, economic, and social perspectives. N. Huijboom and T. V. D. Break argue that public participation in government data openness can help governments address public affairs, create economic and social value, and activate social innovation [6]; M. Kassen notes that public participation can enhance government scientific decision-making capabilities by providing valuable information and collective wisdom [7]; Huang Ruhua points out that introducing public participation in government data openness enables public contributions and expression of interests, thereby helping governments identify new needs, services, and markets [8]. (2) **Stages and content of participation.** Research suggests that public participation should run through the entire process of government data openness, including policy formulation, data creation and collection, data processing, data sharing and utilization, privacy protection, and supervision and evaluation of government data openness. J. Hivon and R. Titah’s empirical study of Canada found that public participation in government data openness involves resource integration and sharing (talent, technology, funding, etc.), portal website construction and APP development, public right-to-know campaigns, government budget control, and prevention of administrative corruption [9]; Chen Chaobing argues that public

participation should be advocated and absorbed in policy formulation and implementation, process control and supervision, result evaluation and feedback, as well as in data formation and collection, data sharing and utilization, and data security and privacy protection [10]. (3) **Methods and pathways of participation.** Scholars have summarized main participation methods and effective pathways focusing on data utilization. D. S. Sayogo et al. identify practical forms including APP data applications, online competitions, data consumption projects, and social media tools [11]; P. Johnson and P. Robinson categorize participation methods into government release of data on platforms for public access, and hosting competitions and cooperative pilot projects to promote value-added data utilization [12]; Zheng Lei suggests pathways including lowering thresholds for data access and interactive communication, implementing platform interaction functions, and strengthening social media tool usage [13]. (4) **Types and models of participation.** Some scholars have generalized participation types based on practical experience. R. E. Sieber and P. A. Johnson categorize citizen participation models into data on the wall, code exchange, citizen issue tracker, and participatory open data [14]; Sha Yongzhong and Zhao Rundi propose four types in examining U.S. open government initiatives: online participation, formal participation, face-to-face participation, and open government culture creation [15]. Other scholars have focused on participation models in data sharing and utilization. Li Ping divides data utilization models into enterprise-led and public-led types based on different dominant forces [16]; Huang Ruhua summarizes cooperation models between the public and government in government data openness as government-led, enterprise-led, and government-led market operation [17]. Some scholars have specifically studied enterprise participation models. G. Magalhaes and C. Roseira expand five public data usage purposes into twelve enterprise utilization models: advocacy, consulting, data refinement, data structuring, single-purpose applications, interactive applications, data platforms, open data portals, business intelligence, process optimization, product/service improvement, and research and development [18].

Overall, existing research has addressed some fundamental issues and produced valuable findings, but two shortcomings remain: (1) **Limited direct research on public participation in government data openness.** Most related research is scattered within other topics on government data openness (such as policy formulation, data sharing and utilization, privacy protection), with few studies directly addressing public participation in government data openness. This limits theoretical depth by failing to thoroughly explore the elements and processes of public participation. (2) **Insufficient systematic and theoretical research on participation models.** Although some scholars have proposed noteworthy perspectives on public participation models in data utilization from the perspective of participation subjects, government data openness is a systematic activity. Public participation should not be limited to the data utilization stage but should be expanded throughout the entire lifecycle of data openness, as well as various elements such as policy formulation, privacy protection, and data security. Moreover, most scholars' research on participation

models remains at the level of basic introduction or interpretation of participation forms, lacking systematic theoretical construction of participation models.

Based on this analysis, this study draws on the classic Western democratic political theory—the Public Participation Ladder Theory (Ladder of Citizen Participation)—and combines it with the contextual characteristics of government data openness to explore and construct theoretical models of public participation in government data openness. On this basis, using multi-case study methodology, this paper provides narrative explanations and empirical case support for the constructed models of public participation in government data openness.

2. Construction of Public Participation Models in Government Data Openness

2.1 Basic Concept Definitions

The term “public participation” originates from the West and is an important concept in political science and public administration. Drawing on Professor Yu Keping’s definition of public participation from Peking University [19], this paper defines public participation in government data openness as: the behavior of social actors expressing opinions and demands, providing and obtaining information and data, and cooperating with government through specific methods and procedures during the government data openness process, aiming to improve the quality and satisfaction of government data openness. Specific connotations include: First, participation subjects include natural persons and legal persons in organizational forms, such as enterprises, social organizations, autonomous organizations, news media, and ordinary citizens. Second, participation stages cover the entire lifecycle of government data openness from data collection and processing to public release and value-added utilization, running through the entire process of policy formulation and implementation. Third, participation methods and pathways include both traditional democratic consultation meetings, hearings, seminars, and expert 论证 meetings, as well as online surveys, open data dialogues, data platform feedback mechanisms, and data roundtables in the information network era. Finally, participation value lies in enhancing public political trust, support, and satisfaction with government data openness, and improving policy recognition and service quality.

A “model” generally refers to the standard form of something and has gradually evolved into a method, paradigm, or structural system [20]. Therefore, the public participation model in government data openness in this paper refers to a simplified and standardized pattern integrating participation subjects, stages, pathways, objectives, and results.

2.2 Public Participation Ladder Theory and Its Applicability

The Public Participation Ladder Theory was proposed by American scholar Sherry R. Arnstein in 1969 in the article “A Ladder of Citizen Participation.” The theory posits that based on criteria such as the source of dominant force in public participation, public awareness of government information, primary means of participation, and degree of public self-governance, public participation can be divided into three levels—“non-substantive participation,” “symbolic participation,” and “substantive participation”—comprising eight specific types: manipulation, therapy, informing, consultation, placation, partnership, delegated power, and citizen control, as shown in Figure 1 [Figure 1: see original paper].

The highest level is substantive participation, including three rungs: partnership, delegation, and citizen control. At this level, the public not only achieves partnership with decision-makers but also, accompanied by extensive delegation of authority, sees its decision-making dominance continuously strengthened until ultimately achieving autonomous decision-making. The Public Participation Ladder Theory originated in urban planning and has since been widely applied to public participation analysis in other fields (such as environmental governance [22], community management [23], policy implementation [24]), becoming a classic theoretical tool for analyzing public participation types and models. Regarding public participation models in government data openness, the Public Participation Ladder Theory demonstrates good applicability because: on one hand, it analyzes public participation types and models and classifies distinct participation models based on criteria such as public influence, participation means, and government-public relationships. On the other hand, as a complex systematic project and dynamic development process, government data openness exhibits diverse, complex, and hierarchical characteristics in public participation activities, providing conditions and possibilities for applying the ladder theory to construct different participation models.

2.3 Construction of Public Participation Models Based on Public Participation Ladder Theory

2.3.1 Special Characteristics of Public Participation in Government Data Openness The special characteristics of the field or context in which public participation occurs are important considerations for discussing related propositions, especially when applying general public participation theories to analyze participation in specific domains [25]. Therefore, when using the Public Participation Ladder Theory to construct public participation models in government data openness, a necessary prerequisite is analyzing the special characteristics of public participation in this context.

First, regarding participation purpose, public participation aims to promote the achievement of government data openness objectives. Government data openness, guided by principles of transparency, openness, participation, and

cooperation, seeks to stimulate public creativity, achieve value-added utilization of government data, and enhance government governance capabilities. For public participation, on one hand, opinion expression, information exchange, evaluation feedback, and supervision suggestions are crucial for developing and realizing data value in government data openness [26]. On the other hand, specific participation subjects such as internet companies, big data enterprises, and research institutions can assist governments in addressing insufficient complex technical supply and inefficient public service provision, achieving collaborative governance between government and the public.

Second, regarding the participation process, public participation gradually deepens as the lifecycle stages of government data openness progress. Government data openness follows a full lifecycle including data creation and collection, data organization and processing, data storage and release, data discovery and acquisition, and data value-added utilization and evaluation. As these lifecycle stages progress, public participation experiences different levels of information awareness, opinion feedback, data utilization, and value creation, with the depth of participation continuously increasing.

Third, regarding participation outcomes, public participation directly affects the success of government data openness. In government data openness, the public as participation subjects also holds multiple other identities, such as demanders of government data acquisition and utilization and recipients of government data openness services. This means the breadth of public participation is a key factor influencing the success of government data openness [27]. For governments that dominate government data openness, it is necessary to actively create opportunities and conditions for public participation and improve the quality of public participation to enhance the level of government data openness.

2.3.2 Construction Process of Public Participation Models in Government Data Openness The Public Participation Ladder Theory provides a feasible analytical tool for constructing public participation models in government data openness, but this does not mean all eight models in the theory are applicable. Combining the special characteristics of public participation in government data openness, this study screens the eight participation models as follows:

First, the “manipulation,” “therapy,” and “citizen control” models are excluded. “Manipulation” and “therapy” models represent participation where government holds absolute dominance and the public holds absolute subordination. The public does not engage in autonomous participation behavior but passively and unilaterally accepts government will and information. For example, in the “therapy” model, although governments arrange numerous participation activities for the public, the purpose is not to improve decision-making but to enhance public policy understanding and eliminate dissatisfaction. However, in government data openness, the purpose of public participation is for the public to actively acquire and develop government data, which is the fundamental intention be-

hind establishing participation principles in practice [28]. Therefore, “manipulation” and “therapy” models logically and practically contradict government data openness. Similarly, the “citizen control” model represents complete public dominance in decision-making and execution processes, with absolute decision-making power free from government interference or control. This does not align with government data openness, where government always plays a crucial role as a key actor, and public participation alone cannot accomplish government data openness. This means “citizen control” participation with complete public autonomy does not exist in the reality of government data openness.

Second, the “consultation” and “placation” models are merged. “Consultation” refers to government inquiry about public opinions or feedback on relevant decisions, while “placation” refers to government possible adoption and response to public opinions while ensuring decision-making power remains in government hands. The definitions show that “placation” participation involves partial adoption or response based on “consultation,” with similar government behaviors and practical differences only in whether responses are provided. However, under current requirements for responsive government construction, government must provide timely, rapid, and effective responses to public interest demands and opinion feedback [29], which greatly blurs the practical boundaries between these two participation models. Meanwhile, combining the context of government data openness, both “consultation” and “placation” participation manifest as government acquisition of interest demands and policy suggestions from the public through specific methods and channels, with partial adoption or response. Therefore, this study merges these two models under the collective term “consultative” participation.

Finally, the “informing,” “cooperative,” and “authorized” participation models are retained. “Informing” participation refers to government communication of decision-making information to the public to promote policy understanding and recognition. In government data openness activities, the first step for public participation is understanding relevant policies and information, making “informing” participation essential. “Cooperative” participation refers to establishing equal partnership between government and the public to jointly solve public problems. The main purpose of government data openness is to utilize public professional knowledge to assist in addressing public affairs and create new economic value through public data reuse [30], making government-public cooperation crucial. “Authorized” participation refers to government delegation of partial power to the public for independent exercise, achieving functional transfer to improve administrative efficiency. Government data openness involves highly professional and technical content such as website construction and operation, and APP development, which cannot be effectively achieved by government alone and requires delegation to professional institutions such as universities, research institutes, and technology companies.

2.3.3 Results of Public Participation Model Construction Based on the above analysis, this study divides public participation models in government data openness based on the Public Participation Ladder Theory into four types: informative participation, consultative participation, cooperative participation, and authorized participation. Among them, informative participation focuses on communicating government data openness information to the public; consultative participation aims to solicit public opinions and suggestions; cooperative participation emphasizes establishing equal partnership between government and the public; and authorized participation highlights independent public exercise of rights to achieve joint governance between government and the public. The relationships among these four models can be illustrated through a framework constructed based on two dimensions: participation behavior outcomes and participation behavior development, as shown in Figure 2 [Figure 2: see original paper].

From the perspective of participation behavior outcomes, the degree of public participation gradually deepens across the four models, evolving from symbolic participation to substantive participation (horizontal axis). Simultaneously, the impact of public participation also increases (vertical axis). It should be noted that the length of each ladder rung represents the scope of participation, which gradually narrows as participation deepens. For example, informative participation may run through the entire activity of government data openness (except for confidential content and privacy protection), while cooperative and authorized participation only occur in specific stages.

From the perspective of participation behavior development, the four models demonstrate a ladder-like progression from low to high, where the realization of a higher-level participation model must be based on the previous level. Specifically, informative participation helps the public acquire government data openness information, providing an original information foundation for public participation. Consultative participation aims to solicit opinions and suggestions about data openness and must be built upon information informing and public awareness. Furthermore, consultative participation creates a platform for dialogue between government and the public, laying the foundation for establishing cooperative relationships in cooperative participation. As for authorized participation, it largely depends on the realization of public rights such as the right to know, express, benefit, and supervise in the aforementioned participation models.

The classification basis of public participation methods in the Public Participation Ladder Theory indicates that dimensions such as government intention, dominant force in public participation, information flow, public information awareness, and degree of public autonomy are important for analyzing various participation models. Among them, the government intention dimension points to participation goals and values; the dominant force dimension points to changing relationships between government and the public during participation; the information flow dimension points to information flow direction and public dis-

course power; the public information awareness dimension points to information awareness, understanding, utilization, and creation; and the public autonomy dimension points to the degree of public participation. The following analysis compares the four public participation models in government data openness from these dimensions.

3. Four Models of Public Participation in Government Data Openness

3.1 Informative Participation Model: Communicating Data Openness Information

Government communication of relevant decision-making information to the public, enabling basic awareness and understanding of government activities, constitutes the basic level of symbolic participation. Common informing media and methods include news media, brochures, posters, reply consultations, and staff door-to-door promotion. In this participation type, information flows from participation initiators (government) to participation recipients (the public), with information feedback being non-essential [21]. The informative participation model in government data openness refers to government communication of relevant information through various online and offline methods and channels during various stages and links of data openness, to satisfy public interest in being informed about government data openness.

In the informative participation model of government data openness: First, regarding government intention, the aim is to smoothly communicate information about data openness regulations and policies, goals and tasks, data acquisition and utilization, risk control and security guarantees, enabling public mastery and awareness of basic information. Second, regarding dominant force, government holds priority dominance in initiating, controlling, and ending public participation, while the public occupies a subordinate position of passively receiving information with limited substantive participation. Third, regarding information flow, data openness information flows unidirectionally from government departments to the public, with almost no public feedback to government. Fourth, regarding public information awareness, awareness levels directly depend on government willingness and methods of communication—stronger government willingness and more effective methods result in higher public awareness of data openness information. Finally, regarding public autonomy, as the public only passively receives and understands government-communicated information, public autonomy remains at a low level.

3.2 Consultative Participation Model: Government Consultation of Public Opinions

Government consultation and solicitation of public opinions on necessary decision-making matters, with ultimate decisions to reject, partially adopt, or fully adopt public opinions. Although consultative participation clarifies

the public's right to express opinions and provides channels for expression, government still controls the participation process and outcomes, making it a symbolic participation level. Consultative participation in government data openness manifests as government departments and personnel using methods such as online opinion solicitation, online open data dialogue, suggestion boxes, questionnaires, and citizen meetings to consult public opinions during stages such as demand investigation, policy formulation, implementation, and evaluation [31], with limited adoption of constructive opinions to help optimize data openness policies and improve quality.

In the consultative participation model of government data openness: First, regarding government intention, the aim is to solicit solutions for data openness from stakeholders including enterprises, social organizations, experts, scholars, and ordinary citizens, ensuring democracy in the data openness process and enhancing public recognition and satisfaction [32]. Second, regarding dominant force, although government remains the initiator and controller of participation, the public's influence on the process and outcomes increases significantly with the realization of expression rights and discourse power. Third, regarding information flow, government transmits data openness consultation demand signals to the public while the public expresses opinions to government (though opinions may not be adopted), creating bidirectional information flow. Fourth, regarding public information awareness, as expressing opinions to government requires relatively full cognition and understanding of data openness information, public information awareness in this model substantially improves. Fifth, regarding public autonomy, the public's ability to express opinions on public issues of data openness and the possibility of opinion adoption indicate that the public not only possesses relatively independent subject status but also enjoys a certain degree of autonomy.

3.3 Cooperative Participation Model: Government-Public Cooperation

In the cooperation stage, the relationship between government and the public is no longer one of subordination but equal partnership. Government exercises power in a transparent and open manner, while the public shares decision-making and governance power over public affairs to a large extent by forming decision-making committees with government [33]. Government data openness is a complex systematic project with professional, technical, and knowledge-intensive characteristics, making government-public cooperation necessary. Cooperative participation in government data openness refers to the process where government and the public, through institutional arrangements and mechanism design, leverage their respective advantageous resources to jointly solve data openness challenges and provide data openness services. Based on different cooperation subjects, cooperative participation can be divided into three forms: government-enterprise cooperation (e.g., government-enterprise cooperation agreements), government-society cooperation (e.g., government commis-

sioning social organizations to conduct public opinion surveys), and government-citizen cooperation (e.g., government soliciting policy proposals from citizens) [34].

In the cooperative participation model of government data openness: First, regarding government intention, the aim is to utilize market and social forces to compensate for government shortcomings in data openness, reduce administrative costs, and improve data openness efficiency and quality. Second, regarding dominant force, government enjoys autonomous decision-making power in whether to cooperate, with whom, on what aspects, and how, indicating its continued dominance. Nevertheless, the public also enhances its discourse status and action influence through equal and mutually beneficial cooperation with government, deepening data openness participation. Third, regarding information flow, cooperation scenarios necessarily involve extensive and rich information communication and exchange, with both the public receiving government commands, guidance, consultation, and supervision, and government obtaining public interaction and feedback. Fourth, regarding public information awareness, government proactively discloses information about data openness cooperation projects and exercises power in a transparent and open manner, greatly reducing information asymmetry and safeguarding public rights to be informed about participation in government data openness. Fifth, regarding public autonomy, undertaking government data openness cooperation projects requires relatively high action capabilities (such as project construction, resource integration, and communication coordination), which depends on accumulated social capital and mature social autonomous forces [35].

3.4 Authorized Participation Model: Joint Governance by Government and Public

Authorization as a deep form of public participation essentially reshapes power boundaries between government and the public, achieving sharing of public power and co-governance of public affairs. Decision-makers delegating power to the public for independent exercise means that administrative processes directly controlled by government are redesigned, with the public enjoying policy formulation and execution power to a large extent, while its participation enthusiasm, choice autonomy, behavioral agency, and discourse influence are greatly enhanced [36]. Authorized participation in government data openness refers to government administrative delegation of partial functions in data openness (such as data openness website construction, technical standards formulation, civil servant training, database construction, and technology research and development) to market and social entities to achieve joint governance of data openness affairs. In the process of administrative delegation and power sharing, a “principal-agent” relationship is established between government and the public, with the public independently exercising decision-making power over commissioned matters, thereby achieving deep participation in government data openness.

In the authorized participation model of government data openness: First, regarding government intention, the aim is to transfer data openness matters better suited for market and social entities, streamline government functions, improve efficiency, and stimulate public participation vitality. Second, regarding dominant force, government as the power granter and matter commissioner occupies a dominant position, while the public enjoys independent decision-making and execution power over commissioned matters, substantially deepening its involvement and influence in the participation process. Third, regarding information flow, extensive information exchange and interaction occur between government and the public around authorization and commission matters, specifically in stages such as commission announcement, contractor selection, process guidance and supervision, and result evaluation and acceptance, with both parties exerting important influence on each other. Fourth, regarding public information awareness, with open and transparent government operation, the public can master relevant information about authorized and commissioned matters, satisfying its information needs for decision-making and execution. Fifth, regarding public autonomy, government delegation of relevant data openness matters to market and social entities based on trust in their capabilities indicates that the public has achieved relatively mature autonomous capacity at the authorization participation stage.

3.5 Comparison of the Four Models

Based on the above analysis, the four models of public participation in government data openness—informative, consultative, cooperative, and authorized—can be compared (see Table 1). Table 1 shows that as participation progresses from “symbolic participation” to “substantive participation,” the four models exhibit the following changes: (1) Government intention evolves from communicating information to consulting opinions, then to compensating for its own shortcomings and co-governing with the public. (2) Dominant forces shift from strong government dominance with zero public involvement to weak government dominance with strong public involvement. (3) Information flow changes from unidirectional to bidirectional, with public discourse power continuously strengthening. (4) Public information awareness progresses from basic awareness to relatively full awareness. (5) Public autonomy advances from low to high levels.

Table 1. Comparison of Public Participation Models in Government Data Openness

Participation Model	Government Intention	Dominant Force	Information Flow	Public Information Awareness	Public Autonomy
Informative Participation Model	Communicating information to the public	Strong government dominance, zero public involvement	Unidirectional flow, no public discourse influence	Basic information awareness	Low level
Consultative Participation Model	Consulting public opinions and suggestions	Relatively strong government dominance, weak public involvement	Bidirectional flow, public has some discourse power	Relatively extensive awareness and understanding	Relatively low level
Cooperative Participation Model	Compensating for own shortcomings	Weak government dominance, relatively strong public involvement	Bidirectional flow with strengthened public discourse power	Relatively full awareness	Relatively high level
Authorized Participation Model	Joint governance with the public	Weak government dominance, strong public involvement	Bidirectional flow with substantial public discourse power	Full information awareness	High level

4. Case Studies of Public Participation Models in Government Data Openness

In recent years, numerous vivid practices of public participation in government data openness have emerged worldwide. Some typical and representative cases with mature practices, high social attention, and wide influence provide direct empirical validation for the theoretical models constructed in this paper. In selecting cases, this study primarily considered: (1) **Completeness of case elements**, meaning cases can largely reflect the elements of specific participation models; (2) **Significance of case effects**, meaning cases have specialized practices and notable effectiveness in specific participation models; and (3) **Accessibility of case materials**, meaning case data can be collected through academic literature, media reports, and official websites. Based on these criteria, this study selected Australia's government data openness inventory and reports for the informative participation model, the UK's Open Data Dialogue for the consultative participation model, Shanghai's data openness competition for the cooperative participation model, and Guangdong's government procurement of data openness services for the authorized participation model.

4.1 Informative Participation Model: Australia's Government Data Openness Inventory and Reports

Informing is the basic manifestation of public participation in government data openness. In practice, governments adopt diverse methods and channels such as government websites, social media, policy releases, and leader speeches to inform the public about government data openness information, increasing public cognition and understanding. Taking Australia's government data openness inventory and reports as an example, to help the public conveniently and quickly query data openness information, the Australian government not only publishes a data openness inventory on its data openness website containing information such as data fields, abstracts, items, formats, openness types, conditions, and update frequencies, but also conducts weekly statistics on the number of open datasets, open data status of various agencies, dataset editing and updating, identification of most active agencies, historical changes in open data, and portal website access data, forming data openness progress reports released to the public through data openness websites and social media [37]. Statistics show that Australian public service departments utilize 172 Twitter accounts and 123 Facebook pages, along with a series of blogs, YouTube, and Flickr accounts, to release real-time updates on data openness [38]. Throughout the informing process, the Australian government dominates the content and channels of communication, while the public remains in a passive information-receiving state with low autonomy, belonging to the symbolic participation level. Meanwhile, government leverages government websites and social media channels to transmit data openness information top-down through data openness inventories and reports, ensuring basic public awareness of data openness information and laying the foundation for deeper public participation in other data openness activities.

4.2 Consultative Participation Model: UK's Open Data Dialogue

The core of consultative public participation is decision-makers soliciting opinions and suggestions from the public through specific methods and channels. In government data openness practice, “Open Data Dialogue (ODD)” is a typical consultative participation model, referring to government departments consulting public opinions through online dialogue formats to achieve real-time communication and feedback. Due to advantages such as low cost, high efficiency, strong interactivity, and convenience, open data dialogue is favored by countries worldwide and has become a common consultative participation method in the government data openness field. Taking the UK's Open Data Dialogue as an example, to investigate and understand public attitudes and opinions toward government data openness, the UK Research Councils and the Joint Information Systems Committee (JISC) launched the Open Data Dialogue program in June 2012. The program selected 40 citizens from various industries including railways, banking, and schools for online dialogue to systematically understand public attitudes toward open data, data reuse, and data management policies. Dialogue formats primarily used telephone and online conferences, with dialogue content digitally recorded and preserved for analysis [39]. This open data dialogue format has brought many institutional benefits to the UK, including: establishing open data priorities and developing broader policy frameworks; ensuring citizens meaningfully join discussions and testing formulated open data principles; and obtaining stakeholder demands to better grasp and optimize data openness policy directions. Through open data dialogue and other participation forms, the UK has extensively solicited public opinions, established goals, principles, and tasks for data openness policies, and effectively improved data openness practice. The open data dialogue process reveals that the UK government uses new online dialogue formats to understand and consult public opinions and countermeasures. Although government still dominates the consultation process, the public can actively express opinions and begin to intervene in data openness activities, raising the level of substantive participation. Meanwhile, in this process, the public provides bottom-up feedback on data openness priorities and policy effectiveness based on information awareness and understanding, creating bidirectional information flow. However, participation outcomes—whether opinions are adopted—depend on government attitudes, so public autonomy remains at a relatively low level.

4.3 Cooperative Participation Model: Shanghai's “SODA” Open Data Innovation Application Competition

Cooperative public participation models aim to solve public data openness challenges by leveraging market and social forces. As a typical cooperative participation practice, open data application competitions provide hardware and software conditions for competitions and solicit innovative solutions for data openness and application from various social groups and individuals, thereby “borrowing strength” from the public to solve data openness problems [40].

Taking Shanghai's Open Data Innovation Application Competition (SODA) as an example, since its launch in 2015, the competition has attempted to integrate three value subjects—"data openness providers, product developers, and application demanders"—through government platform-building, government-society cooperation, government-enterprise cooperation, and government-citizen cooperation to stimulate data innovation applications [41]. Government-society cooperation is reflected in joint organization by government and universities and social organizations. For instance, the 2015 SODA competition was organized by the China Industrial Design Research Institute (CIDI), jointly established by the Shanghai Municipal Commission of Economy and Informatization and the China Industrial Design Association, while the 2018 competition was organized by the Shanghai Big Data Application Innovation Center, jointly established by Shanghai Jiao Tong University, Fudan University, and Shanghai University. Government-enterprise cooperation is reflected in cooperation between government and enterprises on competition data provision and data security assurance. For example, the 2018 SODA competition attracted enterprises such as Alibaba Cloud Data Platform, Baidu Open Platform, and Amap Open Platform to provide competition-specific data [42], while the 2019 competition invited UCloud Technology Co., Ltd. to provide a "Safe House" data sandbox computing environment to ensure security in data value mining [43]. Government-citizen cooperation is reflected in teams of professional and high-quality talents participating in SODA competitions. From 2015 to 2019, competition teams reached 1,500 with over 6,700 participants, covering software engineers, data analysts, management consultants, designers, and students [44]. This case demonstrates that throughout the competition planning and implementation process, the Shanghai government actively facilitated cooperation among social organizations, enterprises, and citizens, effectively compensating for its own shortcomings in professionalism, knowledge, and technology. Although government holds the power to select and determine cooperation partners and forms, the public has intervened in the design and execution of the competition, with participation outcomes directly affecting competition effectiveness. Meanwhile, the public can choose participation forms according to government needs (such as assisting in organization, providing technical support, or participating in APP development), achieving relatively high autonomy. Effective public participation cannot occur without sufficient information flow, and at this stage, government and the public have established equal cooperative relationships and stable, smooth bidirectional communication, with public discourse power stronger than in consultative participation. Additionally, the public has begun to creatively utilize government data for practical applications such as APP development, with information awareness progressing from awareness and understanding to utilization.

4.4 Authorized Participation Model: Guangdong's Government Procurement of Data Openness Services

Function outsourcing, administrative power sharing, and public affairs co-governance are basic characteristics of the authorized participation model.

Authorized participation in government data openness mainly manifests as government procurement of public services, where government outsources originally self-assumed data openness functions to institutions, enterprises, social organizations, and autonomous organizations through open bidding, directed entrustment, and invitation bidding to improve the efficiency and quality of data openness service provision and meet heterogeneous, diversified, and personalized public demands. Taking Guangdong's government procurement of data openness services as an example, in recent years Guangdong has actively signed entrustment agreements with market and social entities to vigorously promote procurement of data openness services, successively transferring services such as data openness and sharing standards, data openness platform construction, and data collection and statistical analysis [45]. Regarding data openness and sharing standards formulation, the Guangdong Provincial Commission of Economy and Informatization authorized the Guangdong Provincial Institute of Standardization to design the system through open bidding and ultimately adopted its established data openness standard system [46]. Regarding government data openness service platform construction, the Guangzhou Municipal Overseas Chinese Affairs Office signed an administrative agreement with Guangzhou Zhengtong Information Technology Co., Ltd., entrusting it with building Guangzhou's overseas Chinese affairs data and data openness service platform project [47]. Regarding data collection and statistical analysis, Guangzhou's Conghua District Culture, Radio, Television, Press and Publication Bureau authorized China Unicom's Guangdong Branch to collect, statistically analyze, and provide visual data analysis research reports on tourism big data [48]. Through administrative authorization, market and social entities independently produce and provide data openness services purchased by government. Guangdong has not only optimized resource allocation and service supply efficiency in government data openness, successfully solving a series of technical and professional challenges faced by government, but also provided substantive pathways for public participation in data openness, effectively enhancing public sense of gain and recognition in government data openness. In this case, the Guangdong government transferred partial functions to professional institutions through service procurement, achieving government "downsizing" while more effectively improving service provision efficiency in government data openness. Notably, the premise for government procurement of data openness services is active public participation in the bidding process for relevant businesses, where government dominance only plays a role in decision-making stages, while the public enjoys autonomous decision-making and execution power over commissioned services, achieving high-level autonomy. Meanwhile, the quality of public participation directly affects data openness service provision effectiveness, indicating that public involvement and influence have reached high levels. To better achieve service effectiveness, extensive information exchange and interaction occur between government and the public around authorization and commission matters, with the public gradually evolving from information utilization to information provision, achieving extremely high information awareness.

Conclusion

Public participation is an inherent requirement and essential characteristic of government data openness and an important principle that governments worldwide must adhere to in promoting data openness work. How to understand and interpret the widespread phenomena and activities of public participation in current global government data openness practices, and thereby help government departments better implement participation principles and safeguard public participation rights in government data openness, constitutes an important research topic. This study employs the Public Participation Ladder Theory as an analytical tool and combines normative and empirical analysis methods to explore and construct theoretical models of public participation in government data openness. The main research findings and conclusions are: First, public participation in government data openness refers to the behavior of social actors expressing opinions and demands, providing and obtaining information and data, and cooperating with government through specific methods and procedures during the government data openness process, aiming to improve the quality and satisfaction of government data openness. Second, based on the Public Participation Ladder Theory and combined with the special characteristics of government data openness, public participation models in government data openness can be constructed into four types: informative participation, consultative participation, cooperative participation, and authorized participation, with core meanings respectively being government communication of data openness information to the public, government consultation and absorption of public opinions, equal cooperation between public and government, and joint governance by government and public. Third, the four public participation models in government data openness exhibit characteristic differences in government intention, dominant force, information flow, public information awareness, and degree of public autonomy.

These research conclusions offer positive policy implications for government departments in conducting data openness public participation work. On one hand, government departments at all levels can adopt flexible and diverse public participation methods and pathways in data openness, and based on the unique functions of different participation methods, targetedly satisfy public participation demands for information awareness, opinion expression, data acquisition and utilization, and cooperative autonomy in government data openness. On the other hand, when formulating public participation policies for data openness, government decision-making departments can use diversified participation models as references and make specialized policy designs for different models to ensure the smooth realization of public participation policy objectives in government data openness.

As a preliminary exploration of public participation models in government data openness, this study has several limitations. First, the systematic and in-depth nature of the research needs strengthening. The logical analysis in applying the Public Participation Ladder Theory to construct participation models is not yet

fully comprehensive and systematic. The theoretical analysis and discussion of the four constructed participation models require further depth. Second, there are limitations in case empirical material collection and utilization. Primary reliance on official publications and news media for case materials may limit comprehensive case understanding. The fit between case materials and theoretical arguments in empirical research needs further improvement. Addressing these limitations will be the focus of future research, while also calling for greater academic attention and discussion on public participation in government data openness.

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The Model of Public Participation in the Open Government Data: Theoretical Construction and Case Study

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Abstract: [Purpose/significance] This paper discussed the theoretical model of public participation in open government data, aiming to guide government departments to achieve the policy objectives of public participation in open data and to promote research progress in this field. [Method/process] Using the theory of public participation ladder as an analysis tool, and using the methods of literature analysis, logic analysis and case analysis, this paper constructed and demonstrated the public participation model in open government data. [Result/conclusion] The theoretical model of public participation in open government data can be constructed as four types: informative participation, consultative participation, cooperative participation and authorized participation. Their core meanings are that the government communicates information to the public, the government consults and absorbs public opinions, the government and the public cooperate equally, and the government and the public

govern together. These four theoretical models of public participation in open government data are obviously different in government intention, leading force, information flow, public information awareness and public autonomy, and have gained good experience support from domestic and foreign public participation practice cases.

Keywords: open government data; public participation; theory of public participation ladder; theoretical model

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

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