The mechanism of the role of digital government in enhancing the capacity of grassroots public services

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Abstract. Under the macro background of the deep integration of modernization of national governance and digital technology, the construction of digital government has become the core engine driving the profound transformation of public services. However, grassroots public services have long been confronted with practical predicaments such as scattered resources, low efficiency, and mismatch between supply and demand. This study aims to explore the intrinsic mechanism by which digital government systematically enhances the capacity of grassroots public services. By constructing an integrated analytical framework of "technology empowerment - process reengineering - collaborative governance", this study systematically dissects the key paths of digital government in achieving resource decentralization through data sharing and platform integration, promoting efficiency transformation through the online transformation and reconfiguration of service processes, and facilitating governance model innovation by building a diversified online collaborative network. Research findings reveal that this empowerment process is simultaneously constrained by multiple complex factors such as institutional mechanisms, digital literacy, and the digital divide. To this end, systematic optimization should be carried out from multiple dimensions such as institutional design, technological development and organizational guarantee, promoting the deep integration of technical logic and governance logic. Ultimately, this will achieve a paradigm shift in grassroots public services from "passive supply" to "active response", and from "fragmented management" to "overall intelligent governance", providing theoretical references and practical paths for advancing the modernization of grassroots governance.

Keywords: Digital government, Governance capacity, Public services.

1. Introduction

1.1. Research Background and Problem Presentation

With the new round of technological revolution sweeping the world, digitalization has become a key force in promoting the modernization of the national governance system and governance capacity. The in-depth advancement of China's "Digital China" and "Cyber Power" strategies marks that the government's digital transformation has entered a new stage of overall coordination and comprehensive improvement from partial exploration. As the core carrier of this transformation, digital government aims not only to move traditional services online, but also to reshape the government's business processes, organizational structure and governance model through data-driven, platform support and intelligent applications, in order to provide more efficient, precise and inclusive public services.

While macro strategies are accelerating their implementation, the grassroots level, which serves as the cornerstone of national governance and the "last mile" of public service supply, directly affects the people's sense of gain and happiness in terms of governance and service quality. At present, China's grassroots public services still face significant challenges: there is a structural contradiction in resource allocation where there are "thousands of threads at the top and only one needle at the bottom", leading to a mismatch of rights and responsibilities at the grassroots level and fragmented resources [1]. The service process is confronted with functional bottlenecks such as high departmental barriers and numerous information silos, resulting in the public having to run to multiple places and repeatedly submit applications for handling affairs. The governance model has institutional shortcomings such as insufficient social participation and delayed feedback on demands, making it

difficult to address the increasingly complex and diverse personalized and dynamic demands of people's livelihood.

Against this backdrop, the construction of digital government offers an unprecedented historical opportunity to address the predicament of grassroots public services. From "One-Stop online Service" to "City Brain", and from "grid-based management" to "integrated platform", a series of innovative practices are profoundly changing the service scenarios at the grassroots level [2]. However, the introduction of technology is not merely a simple accumulation of tools; its effectiveness is profoundly influenced by institutional, organizational, and social contexts. In current practice, problems such as "digital formalism", the separation of technology and business, and the "digital divide" between the old and new have also emerged [3]. Therefore, a core question that is both of theoretical value and practical urgency urgently needs to be answered: Through what internal mechanism does digital government systematically and substantially enhance the capacity of grassroots public services? What is its empowerment path and what deep-seated constraints does it face? An in-depth exploration of this issue constitutes the logical starting point of this study.

1.2. Analytical Framework and Core Concepts

To systematically analyze the above issues, this study first defines the core concepts and constructs an integrated analytical framework.

Core concept definition:

1. Digital government: It refers to a new form of government in the digital age, which is driven by data as the core, supported by modern information networks and intelligent technologies, and realizes the digital and intelligent operation of government duties through reshaping business processes, optimizing organizational structures, and innovating governance models. Its core features lie in overall collaboration, data sharing, precise services and intelligent decision-making.

2. Grassroots public service capacity: It refers to the comprehensive ability of grassroots governance units such as towns (sub-districts), villages (communities) to effectively integrate and allocate human, financial, material, information and technological resources to produce and supply public services efficiently, accurately and fairly in order to meet the basic and diverse needs of the public and society in their jurisdiction, and to continuously improve and innovate. Its core dimensions include the ability to acquire and integrate resources, the ability to accurately perceive and respond to demands, the ability to efficiently supply and execute services, and the ability to collaborate and mobilize multiple entities.

3. Mechanism of action: It refers to the internal laws, processes and logics that generate specific system functions or evolutions through the interaction, connection and mutual restraint among the various constituent elements within the system and between the system and the external environment. This article focuses on the causal chain and dynamic process by which digital government influences the improvement of grassroots public service capabilities.

Integrated analysis framework

Based on multi-dimensional perspectives such as holistic governance, technology execution and capability theory, this study constructs an analytical framework of the interrelationship among the three mechanisms of "technology empowerment - process reengineering - collaborative governance" to deconstruct the functional logic of digital government.

• Technology empowerment and resource integration mechanism: This is a fundamental mechanism. Digital government, by building a unified data platform, business middleware and Internet of Things facilities, realizes the aggregation, sharing and opening of government data, breaks down "information silos", and provides precise "data ammunition" for the grassroots level[4]. This essentially involves transforming technical capabilities into core resources that can be invoked at the grassroots level, thereby enhancing their ability to acquire and integrate resources.

• Process reengineering and efficiency transformation mechanism: This is a key mechanism. Digital technology is compelling and supporting government departments to digitally restructure traditional and fragmented business processes, promoting reforms such as "one-stop online services",

"run at most once", and "one thing, one visit". This has optimized the service path and greatly enhanced the efficient supply and execution capacity of services at the grassroots level.

• Collaborative governance and networked innovation mechanism: This is an extensibility mechanism. Digital platforms provide low-threshold channels for social entities, market players and the public to participate, and have built an integrated online and offline multi-party governance network. This not only expands the sources of service supply, but also enhances the precise perception and response capabilities of grassroots demands and the collaborative and mobilization capabilities of multiple entities through real-time interaction and feedback.

These three mechanisms are not linearly progressive but rather a dynamic whole that is interembedded and mutually reinforcing. Technology empowerment is the prerequisite, process reengineering is the core, and collaborative governance is the deepening. Together, they form a systematic and effective path for digital government to enhance the capacity of grassroots public services. The subsequent chapters will conduct in-depth discussions based on this framework.

2. The core mechanism of digital government empowering the grassroots level

The enhancement of grassroots public service capabilities by digital government is not merely a simple accumulation of technological tools, but rather a systematic reshaping of resource allocation, business processes and governance models at the grassroots level through a set of interrelated and mutually reinforcing mechanisms of action. This chapter, based on the analytical framework of "technology empowerment - process reengineering - collaborative governance", delves deeply into its core functional paths.

2.1. Technology empowerment and resource Integration Mechanism

Technology empowerment is the fundamental and leading mechanism for digital government to act at the grassroots level. The core lies in transforming data, platforms and intelligent tools into key resources that can be configured and utilized at the grassroots level, thereby breaking through the bottlenecks of resource scarcity and information silos in traditional governance and significantly enhancing the grassroots level's ability to acquire and integrate resources.

Firstly, the data aggregation and sharing mechanism has broken down the "information silos". By building a unified data resource platform, the digital government collects, governs and standardizes the basic data such as population, legal persons, geographical space and credit that were originally scattered across various departments. This process has brought about a crucial transformation of data from "departmental private" to "government public". For the grassroots level, this means that through authorization, they can obtain precise data profiles across departments and levels on one port and one platform, thereby achieving a fundamental transformation from "experience-based decision-making" to "data-driven decision-making" and from "fuzzy management" to "precise governance" in epidemic prevention and control, social security, community management and other work. Data has become a new type of production factor for grassroots services and management.

Secondly, the integration of the platform and the intelligence of tools have achieved "resource sinking". The "one-stop online service" government service platform, integrated collaborative office platform and comprehensive grassroots governance platform built by the digital government have become the "highways" for transporting various resources. Through the platform, policy documents, business instructions, training resources and financial information from higher authorities can be directly delivered to grassroots units, significantly reducing the attenuation and distortion of information at the intermediate levels [5]. Meanwhile, the popularization of tools such as mobile terminals, intelligent perception devices, and automated office software has liberated grassroots workers from the heavy manual filling and repetitive tasks, enabling them to focus more on on-site services and conflict mediation. Technical platforms and tools are not merely channels for handling affairs; they are also converters that transform macro institutional resources, information resources, and attention resources into directly operational capabilities at the grassroots level.

2.2. Process Reengineering and Collaborative Governance Mechanism

Technology empowerment makes it possible for process optimization and governance innovation, and process reengineering and collaborative governance are the key transformation mechanisms for converting technological potential into service efficiency, directly enhancing the service supply and collaborative execution capabilities at the grassroots level.

At the level of process reengineering, digital government has driven a profound transformation from "department-centered" to "item-centered". Marked by the reforms of "one-stop online service" and "run at most once", the traditional procedures for handling affairs, which were previously divided among different departments and levels, have been reorganized, connected in parallel and integrated into a complete online service process. For instance, the "One-Stop Service for Newborns" integrates multiple matters such as household registration, social security, and medical insurance into one thing. The public can submit materials at one time through a single entry point, and the back-end system realizes automatic distribution and collaborative approval through data sharing. This means a significant simplification of the service front desk and an enhanced compulsion of back-end collaboration for the grassroots level. The grassroots service Windows or online ports have been transformed from "specialist doctors" to "general practitioners", capable of responding to the comprehensive demands of the public through a unified platform. Meanwhile, complex cross-departmental coordination is automatically or semi-automatically completed in the background by digital processes, significantly enhancing service efficiency and public satisfaction.

At the level of collaborative governance, the digital platform has established a networked governance structure with the online participation of multiple entities. On the one hand, through channels such as government apps, community wechat groups, and online deliberation halls, digital government provides residents, enterprises, and social organizations with low-threshold and immediate platforms for expressing their demands and participating in public activities. This enables the grassroots level to perceive public sentiment and opinions more widely and sensitely, achieving the advancement and strengthening of their demand perception capabilities. On the other hand, based on the platform's mechanisms such as "Blow the whistle and report" and "Respond immediately to complaints", various problems discovered by grassroots grid workers and community residents are precisely pushed to the corresponding functional departments in the form of standardized event forms, and the entire handling process is traceable and managed in a closed-loop manner. This essentially builds a digital-driven cross-level and cross-departmental collaborative execution network, effectively connecting the "visible but unmanageable" situation at the grassroots level with the "manageable but invisible" situation at functional departments. It endows the grassroots level with the ability to coordinate and mobilize a wider range of administrative resources to solve problems, that is, a substantial improvement in collaborative mobilization capabilities.

3. Practical challenges and deep-seated constraints

Although digital government has theoretically established a clear empowerment path, in specific practice, its role still faces a series of structural and operational challenges. These challenges are not inherent flaws of the technology itself, but rather tensions arising from the mutual construction process between the technological system and the existing administrative system and social foundation, which profoundly restrict the full realization of the enabling mechanism.

3.1. Main Practical Predicaments

At present, the empowerment of grassroots public services by digital government mainly faces the following four predicaments in practice:

First, "digital formalism" and the "paradox of effectiveness". Some digital applications pursue "prosperity on the screen", taking the number of launched applications, user registrations, and click-through rates as core assessment indicators, while neglecting the deep integration with offline business processes and the actual problem-solving rate. Grassroots workers are forced to spend a

great deal of time dealing with various system tasks such as clocking in, leaving traces and filling in forms. Instead, technology has exacerbated their burden, leading to "formalism at the fingertips", and the goal of improving technology and efficiency has deviated.

Second, the chronic problems of "new data barriers" and "system silos". Although national and provincial platforms are vigorously promoting integration, at the county and city levels and below, business systems promoted from top to bottom by different departments often fail to achieve true business collaboration and data intercommunication due to inconsistent standards, closed interfaces, and rigid data permission management. At the grassroots level, data often needs to be repeatedly entered among multiple systems, creating a new predicament where "a thousand threads above and a thousand needles below cannot pass through a single net."

Third, the "three shortcomings" of digital human resources at the grassroots level. This is reflected in three levels: "unwilling to use", "not knowing how to use" and "not using well". Some older grassroots cadres have a fear of technical difficulties and path dependence (unwilling to use). Despite the training, there are still operational difficulties (not knowing how to use) when facing complex and changeable systems and application scenarios. More deeply, there is a lack of compound talents who are proficient in both grassroots governance business and digital technology, making it difficult to creatively apply technological tools to solve specific governance problems (and not use them well).

Fourth, the risk of "service exclusion" brought about by the digital divide. While digital services bring convenience, they may also exclude the elderly, people with disabilities, and low-income groups who are not familiar with smart devices and have low digital literacy. Over-reliance on online channels may lead to the marginalization of this group that most needs public service support, exacerbate inequality in access to public services, and run counter to the inclusive original intention of digital government.

3.2. Analysis of Constraints

The above-mentioned practical predicaments are rooted in deeper institutional, organizational and cognitive constraints:

Firstly, institutional and mechanism obstacles are the structural root cause. The long-standing "fragmented" administrative management system is the biggest obstacle to data sharing and business collaboration. Each department, based on its own power, interests and risk considerations, lacks the fundamental motivation to open up data. The pressure-driven system under the "homogeneous structure of responsibilities" makes it easy for higher-level departments to "assign orders" and "push tasks" downward through digital platforms, but fails to simultaneously delegate corresponding resources and authorities, resulting in an intensified imbalance of power and responsibility at the grassroots level.

Secondly, there are deviations in the incentive and assessment system. Current assessment and evaluation often focus more on digital "process indicators" and "visible outcomes", while paying insufficient attention to "outcome indicators" such as the quality of public services, public satisfaction, and the resolution rate of actual problems. This orientation directly drives the behavioral choice of "digital formalism", causing digital construction to be disconnected to a certain extent from the fundamental goal of enhancing service capabilities.

Thirdly, there is a disconnect between technical design and business requirements. Many digital applications and platforms are developed under the leadership of higher-level departments, adopting a "top-down" unified supply model. Their functional designs are often based on idealized general scenarios, making it difficult to meet the diverse specific needs and complex situations of different regions and grassroots levels. There is a contradiction between the rigidity and standardization of technical systems and the flexibility and complexity of grassroots governance affairs.

Fourth, the construction of digital governance culture and capacity lags behind. Overall, government departments have yet to foster a strong culture of "data-driven decision-making" and "open collaboration". Meanwhile, the digital capability training for grassroots cadres mostly remains at the operational level, lacking systematic cultivation of data thinking, platform governance, and

digital leadership, resulting in insufficient depth of technology application and innovation capabilities. The above-mentioned constraints are intertwined and jointly constitute the systematic challenges that digital government must confront and solve to enhance the capacity of grassroots public services.

4. Optimize the path and conclusion

Enhancing the capacity of grassroots public services through digital government is a complex and systematic project. It is not only a process of technological application but also a process of institutional reshaping and governance reform. In the face of the challenges and deep-seated constraints exposed in practice, only by adopting a systematic optimization path and promoting the deep integration of technical logic, business logic and governance logic can the empowerment mechanism operate smoothly and ultimately achieve a substantive leap in the capacity of grassroots public services.

4.1. System Optimization Path

To break through the aforementioned predicament and promote the construction of digital government from "functional realization" to "efficiency improvement", it is necessary to advance in a coordinated manner from four dimensions: system, technology, organization and ecosystem.

First of all, strengthen institutional innovation and standard guidance to break through institutional and mechanism barriers. This is the fundamental guarantee. At the level of data sharing, it is necessary to go beyond the "case-by-case discussion" coordination model. Through legislation or high-level administrative regulations, the ownership, sharing responsibilities, usage scope and security standards of public data should be clearly defined. A negative list system should be established where "public data is shared by default and non-sharing is the exception", and it should be accompanied by incentive and accountability mechanisms based on application effectiveness. At the business collaboration level, it is necessary to promote the unification of standards for government service items, business processes and interaction interfaces at the national, provincial and municipal levels from top to bottom, and compulsorily promote the open connection between vertical systems and local platforms, so as to technically dismantle the "system silos". At the assessment and evaluation level, it is necessary to reform the assessment system, significantly reducing the weight of process indicators such as registration volume and click rate. Instead, the core evaluation criteria should be the results of "good or bad" reviews of public services, public satisfaction, the rate of complaint resolution, and the effectiveness of reducing burdens on the grassroots level, guiding digital applications to return to their original service nature.

Secondly, promote "business-driven" and "inclusive" technology design to ensure that the technology is applicable and effective. This is the key support. Technology research and development as well as deployment must adhere to the principle of "business demand-driven", establish a collaborative development mechanism of "grassroots users - business departments - technical teams", and ensure that the system functions closely fit the actual scenarios on the front line through agile development and rapid iteration. In response to the issue of the digital divide, the principle of "inclusive design" must be enforced. All public service platforms and applications must provide accessibility features, large fonts, voice assistance and other elderly-friendly renovations, and retain traditional channels such as offline and telephone processing to ensure the inclusiveness and fairness of public services. At the same time, we should actively apply cutting-edge technologies such as artificial intelligence and big data analysis, but the focus should shift from "replacing human labor" to "enhancing intelligence". We should develop "AI assistants" that can assist grassroots personnel in precise early warning, intelligent order dispatching, and decision-making analysis, rather than "digital shackles" that increase the complexity of their work.

Finally, consolidate the organizational foundation and digital ecosystem to stimulate internal driving forces. This is a lasting guarantee. In terms of organization and talent, it is necessary to strengthen the dual assessment of digital literacy and governance capabilities in the recruitment and

training of grassroots civil servants. By setting up the position of "Digital Specialist", cooperating with universities and enterprises to carry out customized training, and establishing an incentive mechanism that links "digital capabilities" with career promotion, we systematically cultivate compound grassroots talents who are proficient in business, technology and governance. In terms of the allocation of rights and responsibilities, the principle of "transferring rights, fees and personnel with tasks" should be followed. When tasks are dispatched downward through digital platforms, corresponding data invocation permissions, overall coordination permissions and certain resource allocation permissions should be simultaneously granted to the grassroots level. In terms of ecological construction, the government should position itself as the rule-maker and platform operator. Through means such as purchasing services, public-private partnerships, and incubation support, it should encourage enterprises, social organizations, and professional volunteers to participate in the supply, operation, and optimization of grassroots digital services, and build a multi-party co-governance digital public service ecosystem.

4.2. Research Conclusions and Prospects

This research centers on the core issue of "How digital government can enhance the capacity of grassroots public services". By constructing an analytical framework of "technology empowerment - process reengineering - collaborative governance", the research finds that digital government is not simply about digitizing services online, but rather functions through a set of nested and mutually reinforcing systematic mechanisms: it is based on technology empowerment and resource integration, and through data sharing and platform integration, it transforms data and computing power into new resources that can be allocated at the grassroots level. It takes process reengineering and efficiency transformation as its core, and by reconfiguring cross-departmental business processes, it promotes the transformation of grassroots services from dispersion to integration and from low efficiency to high efficiency. It is deepened by collaborative governance and networked innovation. By building a multi-party online participation network, it has enhanced the demand perception and collaborative mobilization capabilities at the grassroots level. These three mechanisms jointly promote an overall improvement in the capacity of grassroots public services in terms of resource acquisition, precise response, efficient supply, and collaborative governance.

However, this empowerment process is complexly constrained by multiple factors such as institutional mechanisms, incentive biases, and the lack of digital literacy and inclusiveness. In practice, it may lead to challenges such as "digital formalism", new forms of "data barriers", and "digital divide". Therefore, the ultimate effectiveness of digital government in empowering the grassroots does not depend on the application of the most advanced technologies, but on the degree of coordination and adaptation among systems, technologies and organizations.

Looking ahead, there is still vast room for the deep integration of digital government and grassroots governance. Subsequent research can focus on the following directions: First, the assessment of the "long-term effectiveness" and "sustainability" of digital governance, that is, how to establish a scientific evaluation system to measure the long-term improvement in governance efficiency and social value brought about by digital investment. Secondly, explore the in-depth application models and ethical boundaries of cutting-edge technologies such as generative artificial intelligence at the grassroots level, and explore the possibilities and risk management of their role as "grassroots assistants" in scenarios such as policy interpretation, public opinion analysis, and report generation. Thirdly, the dynamic adjustment laws of the power and responsibility structure at the grassroots level in the digital age, studying how the power relations and responsibility distribution among grassroots governments, higher-level departments, market entities, and social organizations evolve under the in-depth intervention of technology. The continuous exploration of these issues will drive the construction of digital government to deepen in a direction that is more people-oriented, empowers the grassroots, and enhances the quality and efficiency of governance.

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