

# Research on the Full Process Management System of Government Informatization Projects under the Background of Digital Organ Construction

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**Abstract.** In the digital age, the construction of government informatization projects to improve governance is becoming a common practice of governments. However, there are many loopholes in the process of government informatization project management, which weakens the actual positive impact of information technology on government services. This paper analyzes the factors that affect the management of government informatization projects and their mechanism by using the TOE theory. On this basis, through the analysis of PDCA theory and full life cycle theory, the evaluation index of the processing system of government informatization projects is constructed. It comprehensively evaluates government informatization projects from the aspects of decision-making, process, output, efficiency and system innovation. This study provides insights into the scientific evaluation and effective management of government informatization projects.

**Keywords:** Government Informatization Projects; Project Management; Full Life Cycle; TOE Theory.

## 1 Introduction

The digital age has brought about rapid advancements in digital and intelligent technology, leading to a wave of digital transformation across various fields. One area of focus has been the reform of government services, which has become increasingly important in the context of modern information technology. Government informatization, which encompasses infrastructure, databases, e-government, and public domain information, has become a crucial tool for improving administrative efficiency and strengthening national management capabilities at all levels of government.

The United States spearheaded the concept of constructing an "e-government" and established itself as a trailblazer in the government's digital transformation. Since 2010, the developed nations have placed significant emphasis on the government's digital transformation. This transformation is considered a significant strategy to improve the overall national strength. Since 2014, the 193 member states of the United Nations have implemented online services to varying degrees, highlighting the importance of digital government construction as a strategic choice for governments to adapt to the trend of digital development.

As a late-developing country in the digital transformation of government, China has entered a

stage of rapid development since the application of office automation was promoted at the end of the 20th century. In 2019, the General Office of the State Council released "Measures for the Construction and Management of National Government Affairs Informatization Projects", providing guidance for planning, approval, construction, capital, supervision, and sharing of national government affairs informatization projects. In 2022, the State Council issued "Guiding Opinions on Strengthening the Construction of Digital Government," which proposes to comprehensively promote the digital transformation of government performance and operations, and accelerate the construction of digital institutions. As a result, government informatization projects will continue to be a key area of government investment and construction.

The Chinese government has made significant progress in its information construction efforts. However, there are deep-seated issues that have arisen due to the lack of scientific and effective project management capabilities and experience. Government informatization projects are complex with long construction periods, high technological requirements, and wide-ranging aspects that cover various industries. Effective management of these projects requires coordination of factors such as technology application, organization, public service, and power systems. The full life cycle theory is an important aspect of modern project management research and can be used to study government informatization project management. This way of management can improve government functions and management efficiency, improve the level of informatization project management, promote the rapid development of high-level construction of digital organizations, and enhance people's satisfaction and happiness. Improving the level of information project management is an urgent problem to be solved.

## **2 Literature review and research questions**

Research on government informatization both domestically and abroad dates back to the 1990s. Layne and Lee (2002) conducted an analysis of the application of "Internet + government" in western countries during this time. They found that this application mainly provides public services through network systems and government service websites<sup>[1]</sup>. Vassilakis et al. (2007) believe that network technology is a tool for reforming the government management mode. The distributed network characteristic enables the effective and rapid spread of government information resources, which changes the way of government projects<sup>[2]</sup>. Reddick (2009) believes that the real challenge faced by government informatization is not information technology, but rather management capabilities. This includes improving the system and supervising of informatization projects<sup>[3]</sup>. Fan (2015) proposed a total factor associated e-government management model through research on the development of local government information in Australia, aiming to improve the level of government informatization by strengthening the relationship between various elements in the project management process<sup>[4]</sup>. Taking Bangladesh as the research object, Amyan et al. (2016) confirmed the significance of excellent government informatization management mode in improving the level of public services but did not propose an effective management system<sup>[5]</sup>. Amato et al. (2016) attempted to extract key semantic features from multi-source documents of government information systems to strengthen knowledge management. They defined the entire life cycle system of multi-source document management, which provided functions such as information extraction, storage, demonstration, sharing, and semantic retrieval for government informatization. In many foreign studies, improving the management level of government informatization projects

through knowledge management has become a development trend that provides decision support for government managers<sup>[6]</sup>.

Based on the management practice of government, Chinese scholars have carried out a lot of research on the operation mode, construction status and problems, construction path of government informatization. Through a comprehensive review and analysis of the development of e-government in China, Zhai Yun (2018) proposed a new path for the development of e-government, including strengthening coordination and accelerating the transformation to an integrated development model; strengthening data governance and accelerating the transformation to business collaboration; focus on the objective needs of informatization management<sup>[7]</sup>. Wang Weiling (2019) argues that government informatization optimizes management by integrating multiple technologies, driving decision-making through data, coordinating and co-governing multiple subjects, and sharing various resources. Therefore, successful government informatization projects require efficient integration and management of underlying technologies like system data collection, sharing, standardization, and security. It promotes government management from departmental simplification and closure to coordination and openness<sup>[8]</sup>.

In advanced countries, the project management system for government affairs informatization is well-established and can effectively support the construction and application of informatization projects. However, China's government informatization management started late and is in the stage of continuous improvement. A sound process management system for government informatization projects has not yet been established, and there is also a lack of unified construction standards and indicator systems. The foreign government affairs management operation system differs greatly from that of China, making it difficult to apply its management experience directly to government affairs informatization projects. Existing research mostly focuses on a single perspective of information technology or knowledge management, lacking in-depth excavation of project process management from a management perspective. Therefore, to improve the management effectiveness of China's government informatization projects, this topic is based on the background of digital organ construction and conducts in-depth research on the influencing factors of government informatization projects. On this basis, the evaluation system of the whole process management of government informatization projects is constructed.

### **3 Analysis of the key factors affecting**

The TOE theory, proposed by Tornatzky and Fleischer in 1990, is a theoretical framework that analyzes the interaction between technology, organization, and environment. It emphasizes that the adoption and application of new technologies are not only determined by the inherent characteristics of the technology itself but also by the characteristics of the organizational structure and the objective environment. The framework uses the three letters T, O, and E to represent Technology, Organization, and Environment respectively. By emphasizing the social and systematic aspects of technological innovation, the TOE framework provides a theoretical basis for evaluating and managing technological innovation. The success of technological innovation is believed to depend not only on the characteristics of the technology itself but also on the support and cooperation of the organization and the environment.

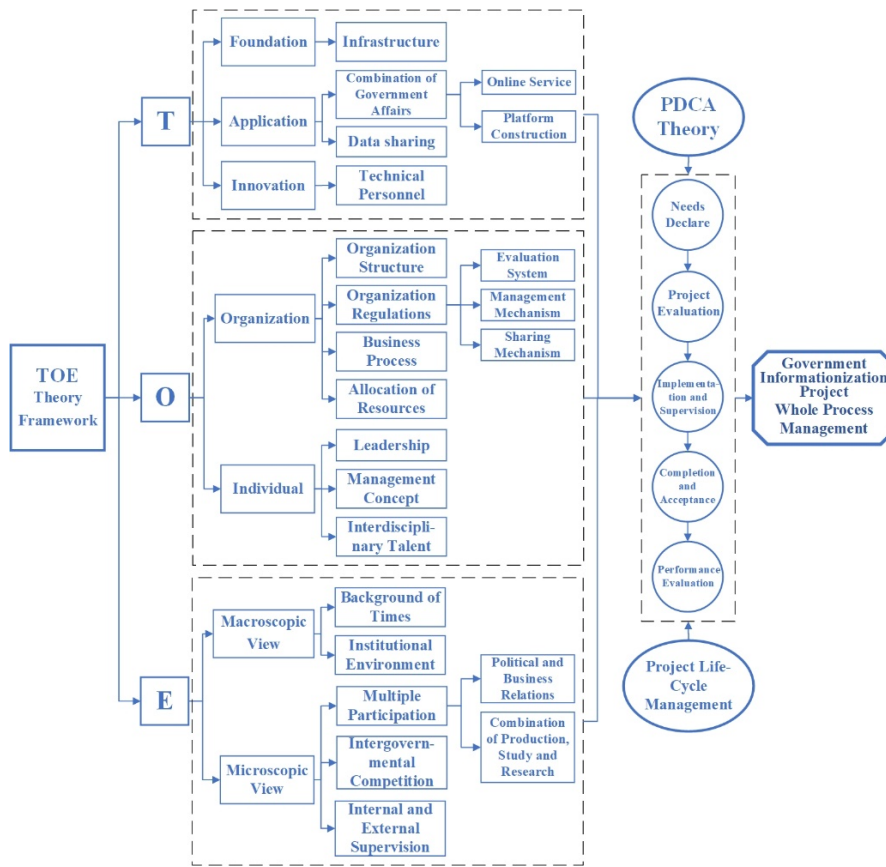


Fig.1 TOE theoretical analysis framework

The Government Information Project is a result of the widespread use and implementation of information technology. However, the success of the project also relies on organizational and environmental factors. All three factors work together to create the right conditions for the project to be successful. Figure 1 shows the factors that influence the project.

Technical factors are a major contributor to project success and can be categorized into three aspects: technical infrastructure, application, and innovation. Technical infrastructure refers to 5G networks, data centers, artificial intelligence, industrial internet, and other new infrastructure. Application of technology includes combining government affairs and data sharing. The government should provide online services such as government microblogs, WeChat, apps, and short video services. They should also have a government affairs platform and system. Sharing and opening data is essential. Sharing and opening data means making data available to others. The government's information system should access an open platform to share data resources in accordance with regulations and requirements. Technological innovation is the ability to innovate, mainly relying on technological professionals. Organizational factors are related to the organization's own characteristics and internal composition, which includes two aspects of the organization as a whole and the individual: on the whole, it includes organization structure,

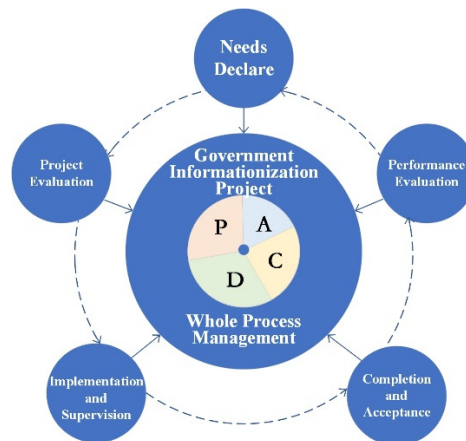
organization regulations, business process, resource allocation, and so on; individuals include leadership, management concepts, 'management + professional' comprehensive talents, etc. Organizational factors are extremely important factors affecting project effectiveness. Environmental factors are divided into macro and micro environments. The macro-environment mainly refers to the background of the times and the institutional environment; the micro-environment refers to the various forces that constitute a direct impact, including multiple participation, intergovernmental competition, internal and external supervision, such as superior supervision and mass supervision, etc.

For government departments, the government information project is not only the application of information technology but also includes the reorganization of processes, the innovation of methods, the renewal of concepts and other links. It is necessary to comprehensively consider various factors of technology, organization and environment.

## 4 Construction of evaluation indicators

### 4.1 Process system construction

Managing the full life cycle of government informatization projects is crucial due to the significant investment required and the lengthy construction period. This cycle follows a specific order, and it's essential to pay close attention to every stage. The PDCA cycle, also known as the Deming Circle, was introduced by Dr. W. Edwards Deming, an expert in total quality management. This cycle consists of four stages: Plan (P) for the planning phase, Do (D) for implementation, Check (C) for inspection, and Action (A) for processing.



**Fig. 2** Process system of government information project management

The full life cycle management is divided into four stages: project approval, implementation, acceptance and post-management. According to the key decision-making points of the government informatization project, the process is divided into needs declaration, project evaluation, implementation and supervision, completion and acceptance, and performance evaluation (refer to Fig.2). Under the PDCA framework, P, the plan of government informatization project plays a crucial role in management. How to evaluate the current level of

government informatization construction is the premise of formulating the cycle goal of new project management. During the planning stage, each unit declares its development goals and needs, and the government reviews the project plans, budgets, and research reports. The key part of D, the implementation of government informatization projects, is the supervision and control of tasks. The implementation of project management needs to run through the full management cycle. The construction unit should establish and improve the responsibility system, implement the whole process management of government informatization projects, and control the quality, progress, capital, contract and other links of the project construction. C, the project evaluation is crucial for managing government informatization projects, serving as the most challenging and vital stage. The government informatization project implements an acceptance and post-evaluation system to demonstrate the effectiveness of project management. A, the application of evaluation results. This stage is mainly to adjust the gap, summarize and solve problems, which is the key to the effectiveness of performance management. By conducting performance evaluation surveys, problems can be identified, corrected, and adjusted, and effective improvement plans can be formulated for the next PDCA cycle.

#### **4.2 Evaluation index construction**

According to the requirements of documents such as " Notice of the General Office of the State Council on Printing and Issuing the Implementation Plan for the Integration and Sharing of Government Information System " and " Notice of the General Office of the State Council on Printing and Issuing the Management Measures for the Construction of National Government Information Projects ", further strengthening the full life cycle management of government informatization projects requires the construction of scientific and practical evaluation indicators. In order to comprehensively evaluate the decision, process, output, benefit and system innovation of the government informatization projects, the results are collected by means of expert consultation, questionnaire survey, field investigation and symposium in practice. The evaluation indicators are divided into first-level, second-level and third-level indicators. The details are shown in the appendix.

### **5 Conclusion**

Although China has made progress in government informatization management and digital government construction, there are still areas that need improvement. This study aims to address these issues and prepare for the future of information technology in government services. By using the TOE model, we analyze the factors that influence government informatization development and project management. We construct a process system and evaluation index for the full process management of government informatization based on the PDCA perspective. It provides a reference for further strengthening the full life cycle management of government informatization projects and improving the efficiency of public services.

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## Appendix

**Table 1** Evaluation index of government informatization projects

First-level indicators	Second-level indicators	Third-level indicators	Third-level indicators explanation
Decision	Project initiation management	Standardization of project establishment	Whether the project is in line with laws and regulations, relevant policies, development plans and departmental responsibilities, whether it is sufficient, and whether the project application and project approval procedures meet the relevant requirements, so as to reflect and assess the normative situation of project approval.
		The clarity of performance objectives	Whether the performance objectives set by the project are based on sufficient basis, whether they are in line with the objective reality, whether the project performance objectives are clear, detailed and measurable, to examine whether the project construction objectives are clear.
	Capital investment	Scientific budget preparation	Whether the project budget preparation has been scientifically proven, there are clear standards, and whether the amount of funds is compatible with the annual target, which is used to reflect and evaluate the scientific and reasonable situation of project budget preparation.
Process	Organize implementation	Compliance with bidding work	Whether in accordance with the relevant provisions of the project bidding procurement.
		The soundness of the management system	Whether the project management mode and the management system of the project implementation unit are sound is used to reflect and assess the guarantee of the management system for the smooth implementation of the project.
		Project acceptance compliance	Whether to organize acceptance in accordance with the provisions, how about the quality of acceptance.
	Use and operation management	System operation and maintenance management	Whether the operation and maintenance management system, organization and personnel meet the requirements and operate effectively.
		Security management	The safety guarantee capacity construction and evaluation of the system are investigated.
		Quality control	Whether the quality standards are sound, whether the quality inspection is standardized, and whether the implementation and management of the contract are standardized.
	Project fund management	Capital management compliance	Whether all funds are in place in a timely manner and whether they are implemented in accordance with the budget.

First-level indicators	Second-level indicators	Third-level indicators	Third-level indicators explanation
		Financial management standardization	Whether the use of funds is reasonable, whether the financial management system is sound, and whether there is effective financial monitoring.
	Summary and evaluation of construction implementation	The implementation of the whole situation	The major changes, project supervision and testing were investigated.
		Summarize the situation	Whether the construction unit issued a summary.
Output	Completion of construction tasks	Actual completion	The ratio of the actual output number of the project implementation to the planned output number of the project approval is used to reflect and evaluate the degree of realization of the project output quantity target.
		Completion timeliness rate	Whether the project is accepted according to the contract time.
		Cost of output	Cost savings rate.
	System application performance	System function availability	Is the built system interface and functional operation settings available?
		System function ease of use	The system interface and function module design are friendly, reasonable, beautiful and easy to use.
		System stability	The performance stability of the system is reflected by the system error.
Benefit	System usage	System user usage	The proportion of the system used by the user group of the department at this level is used to reflect the user's use of the system.
		System user satisfaction	The satisfaction of the target user group on the use of the system.
	Business support situation	The overall business service coverage of the project	The breadth of system support for government business.
		Business Support Depth	The depth of system support for government business process.
		Business support effect	User's evaluation of business support effect.
	Data situation	Compilation of data resource directory	From the aspects of data source, data field and data category, including government data, social data and scientific data, the connection between non-classified information systems and provincial government information resource sharing and exchange platform and data sharing are evaluated.
		Data resource completion	The completeness of the scope, type, time and other elements of information resources.



First-level indicators	Second-level indicators	Third-level indicators	Third-level indicators explanation
		Data resource completion quality	The quality of system information resources and the degree of matching with user needs.
		Application of data innovation	Evaluate the innovative application of project data.
	Shared collaborative services	Business collaboration	It is mainly to promote integration and accelerate the integration and sharing of information systems within the department.
		Cloud resource utilization	Two main application servers were selected to test the CPU load and average memory occupancy of the server during 9: 00-11: 30 and 14: 00-17: 00.
		Online Service Capability	It mainly examines the external service capability of the e-government system.
	Sustainability	Sustainability	The saturation, expansibility, configuration flexibility and economy of system maintenance of the current system are evaluated.
	System application benefit	Construction goal realization degree	Whether the main assessment system is implemented in accordance with the established objectives of the project.
System innovation	Technology and application innovation	Technological innovation	Project application innovation, technology application, application security, iterative optimization and other aspects of innovation.
		Autonomous controllable rate	The autonomous controllable rate mainly evaluates the localization ratio of basic software and hardware and application software in the process of informatization project construction.
	Propaganda situation	Demonstration pilot	National pilot or local pilot/demonstration projects, application of national or provincial applied scientific research projects.
		Media publicity	The project was reported by national and provincial mainstream media.
		Leadership instructions	The project has been approved by the leaders above the provincial and ministerial levels of the country and the leaders above the bureau level of the provincial department.
		Typical introduction	The introduction of projects in national and provincial platforms and conferences.
		Awards won	The project won awards at the national and provincial levels.

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