Study on Development Bottleneck and Service Strategy of China E-government Cloud Platform in the Big Data Era

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Abstract. Since the major decision of “internet + government service” was proposed, Chinese local governments have explored the new-type service mode of e-government platform in succession. However, the “isolated information island” and “split data lake” are formed due to poor connectivity of government data among departments. By online researching and analyzing the the current situation and development bottleneck of China’s e-government, the authors designed the e-government cloud platform system framework from the perspectives of big data and value co-creation, and then put forward a series of suggestions, such as establishing data-oriented value co-creation mechanism, developing the system which realizes real-time visualization of public demands and so on, thus to provide references for meet “the people’s growing need for a better life” proposed by President Xi in the reports of the 19th National Congress of the Communist Party of China.

1. Introduction
In March 2015, Premier Li Keqiang proposed “internet+” action plan formally [1], and in the same year, the “internet + government service” was taken as one of the major development fields in Guidance Opinions of the State Council about Actively Promoting “Internet+” Action [2]. In January 2017, General Office of the State Council of the People’s Republic of China printed and distributed Guideline of Technical System Construction of “Internet + Government Service”, and proposed the online government service platform construction principles of “adhering to problem orientation, enhancing top-level design, promoting resource integration and so on” [3]. Meanwhile, the overseas developed countries started to explore the new mode of smart government service in succession, and also, China energetically promoted the construction of online service hall and data open platform. In 2017, Jiangsu provided the approval service of no meeting for the public, creating the government service “one net”; the convenient service platform of Nanning Public Security Bureau and “Love Nanning” APP provided “diversified” convenient service channels. In 2018, Qingdao integrated the government service application terminals of 41 departments, and will realize the whole city’s VPAD within the year. Guiyang data open platform conducted statistical analysis on visit source and department data update frequency, establishing the clear visual diagram for users to check and use (as shown in Figure 1), which provides good references for the construction of e-government cloud platform and also proposes higher requirements.

However, the prominent problems such as disconnected data, inconvenient online service, repeated website construction, and wasted data source are still exist. In order to solve the above problems, domestic and overseas scholars basically achieved consensus as for establishing “internet +
government service” based on cloud computing framework, and moreover, the domestic scholars mainly proposed to construct cross-regional, cross-sector and multilevel government data open share platform [4~10].

In this paper, we designed the e-government cloud platform architecture based on big data service concept and value co-creation theory. The structure is organized as follows: Section 2 summarizes the problems existed in China’s e-government platform. Section 3 presents the construction and countermeasures of e-government cloud platform based on big data and value co-creation. Finally, Section 4 concludes the paper and points out the development prospects of China’s e-government.

Figure 1. Access data of Guiyang government data open platform from January to June 2018.

2. Analysis on the Problems Existed in E-government Platform in the Big Data Era

With the increasing development of our country's informatization level, the level of collection, excavation, and application of data resources has been continuously deepened. According to the "Big Data Industry Development Plan (2016-2020)" issued by the Ministry of Industry and Information Technology, the level of informatization in China's government affairs continues to increase, with 84,000 government-facing government websites nationwide. Nearly 300 cities during the 12th Five-Year Plan conducted smart city pilot projects. According to the China Open Data Platform Index rankings, Foshan, Harbin, Shanghai, Qingdao, and Guangzhou rank among the top five. China's open data platform index and ranking are shown in Table 1.

Table 1. Local government platform data openness index.

| Rank | Area       | Platform Index |
|------|------------|----------------|
| 1    | Foshan     | 75.1           |
| 2    | Harbin     | 74.5           |
| 3    | Shanghai   | 74.2           |
| 4    | Qingdao    | 74.0           |
| 5    | Guangzhou  | 68.9           |
| 6    | Shenzhen   | 63.7           |
| 7    | Guiyang    | 60.9           |
| 8    | Guangdong  | 51.7           |
| 9    | Beijing    | 50.7           |
| 10   | Wuhan      | 46.1           |

2.1. Poor Data Connectivity Between Government Departments

Because of lacking the unified and reasonable plan and effective data share mechanism, there are poor effects of interconnection for multilevel and cross-sector government information system, thus a series of “information isolated island” and “data stack” are formed, and consequently, it causes the repeated data collection, poor consistency, and low utilization, which severely influences the public and enterprise orientated government service level and efficiency.

For example, through browsing the interactive columns such as “write to the government” and “interaction and communication” of Qingdao municipal government affairs network, it is found that individual department cannot provide the data demanded by the public, the public needs to submit data use application to other departments again, and even there is the phenomenon that lots of departments
mutually make excuses. In addition, users need to fill in lots of spreadsheets repeatedly during performing multiple online service tasks. Unfortunately, the website cannot invoke the user’s information directly from the related departments, which illustrates that it lacks of necessary cross-sector data share and open.

2.2. Imperfect Online Public Service Functions
The original intention of e-government platform construction is to complete grassroots governance, and taking serving the people as the starting point and foothold, the public’s sense of gain is enhanced eventually. However, most of regions lay too much emphasis on platform forms, and ignore the content usability, and the service entrance design is not simple and clear enough. For example, in “service” column of Shandong government service affairs website, a part of service items shows as a coordinated online process service, but after clicking on the link, there is only the simple service notes. The government affair APPs are developed excessively, when opening some APPs, the problems such as abnormal data loading and blank page are very common, and those “zombie data” and “zombie APP” brought a great inconvenience for the public. It fails in “finishing the whole work online” after users conducted a series of complex registration and login operations, thus a large amount of time and energy is wasted. With the unsatisfactory online experience, the public’s responsibility is low naturally, which hinders the adoption and improvement of e-government undoubtedly.

2.3. High Operation and Maintenance Costs
Due to lacking of effective share and collaboration mechanism among departments, the hardware facilities, basic software, and middleware, etc. are purchased repeatedly, the large amounts of repeated e-government application systems increased the R&D costs and circle, and also improved the difficulties of operation and maintenance. For example, Shandong unified administrative service network has been included into the city stations such as Jinan and Qingdao, but these urban independent government service platforms still exist, which causes two entrances for one service, this is unnecessary, and also reflects the phenomena of platform’s repeated construction and wasted government service resource.

3. Construction and Countermeasures of E-government Cloud platform
In order to solve the above problems and meet the public’ growing needs, the e-government platform system framework based on big data and cloud computing background is designed. The ideas such as service and value co-creation are endowed for the platform data. The cloud platform architecture is shown in Figure 2. The cloud platform framework is shown in Figure 2.

3.1. Core Service Layer: Cloud Computing Service Layer
Cloud computing service layer is divided into three sub layers, and namely, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). The contents, technologies, functions and other characteristics of three layers are as shown in Table 2.

3.2. Cloud Service Application Layer
Cloud service application layer faces to the government, public and enterprise, and provides the services such as administrative power operation service, convenient service, and decision-making support. Administrative power operation service mainly enhances the trans-regional, multilevel and cross-sector government service data share integration and business collaboration with the cloud platform, truly realized a coordinated online process service of all affairs, instead of the single “guideline”, and realizes the coordinated online process service with the characteristics being “standardized service, standardized procedure, convenient experience, and shared data”. Convenient service mainly provides the modernized services such as smart education, smart medical care, and convenient traveling to the public and enterprise, optimizes the people’s life and cares about the enterprise’ operation. Decision-making support service is mainly supported by big data technology, and provides references for the making of decisions such as social economic development, clean governance risk prevention and control, and emergency management with the method of man-machine coordination.
3.3. Data as a Service (SaaS)
Comparing to the traditional e-government platform, SaaS conforms to the construction philosophy of smart city and smart government service more. SaaS collects, filters and cleans diversified online data (government service website, government service APP, government service WeChat, and government service Blogs, etc.) and offline data (community and office hall, etc.) from multiple approaches, providing the data service such as checking, downloading, invoking and analyzing for the government, public and enterprise, and meanwhile, providing the corresponding data service for PaaS and SaaS.

First, data and service layers promote the connection and share of all departments’ government service through data processing and integration, and make the public key needs clear through data processing, analysis and visualization, providing supports and references for dynamically depicting the public’s need changes and providing personalized services for different user groups. In the end, the multi-granularity and all-round data city view is constructed through integrating the diversified government service data, providing data supports for the government macroscopic decision-making, enterprise operation and resident life.

3.4. Service Management Layer and Standard Specification Layer
Service management layer and standard specification layer provide guarantee for platform design, development and normal operation. Service management layer includes service quality guarantee, security management, visit and control management, personnel management and resource management, etc., formulates government service level agreement, makes sure that supplier and buyer reach a consensus on needs of service quality, and guarantees the availability, reliability, and data security of service layer. Standard specification layer mainly formulates the standard specification of business collaboration, data description and exchange, security and visit control, providing specification for all government departments to collaborate seamlessly in virtue of cloud computing service.

Some online government service reference strategies are proposed aiming at the above stated development bottleneck and e-government platform system framework and combining with big data era and value co-creation theory.
Table 2. Characteristics of three cloud service layer.

| Service layer | IaaS | PaaS | SaaS |
|---------------|------|------|------|
| Service object | Users demand hardware resource | Programming personnel | Users demand software application |
| Content and function | Integrate resource and form virtual resource pool, allocate resource dynamically according to government service needs, and provide basic facility deploy service | Provide application software development, deploy, management, test and operation environment to the government, public and enterprises | Provide the renting service of government affair application software |
| Key technology | Xen, KVM, VMware, and virtual technology, etc. | Data storage technology, data process model, and provide application program deploy and management service | Provide the fast deploy application program service based on the internet |
| Use mode | Users upload data, program code and environment allocation | Users upload data and program code | Users upload data |
| Representative case | Amazon EC, and Eucalyptus, etc. | Google App Engine and Hadoop, etc. | Google Apps and Salesforce CRM, etc. |

3.5. Other Related Measures

In the era of data growing unceasingly and information changing rapidly, the government only acquires the public demands and suggestions through messages left, and then improves or replies. This kind of procedure has the disadvantage of postponement of information.

All local governments should enhance the cooperation with high-tech enterprises, and develop the online public need dynamic observation system which can be implanted in government service platform with the technologies such as Internet of Things and cloud computing as soon as possible, thus to master public’s voice to themes and data in real time, analyze the public’s demand behaviors about the items such as browsing, downloading and consulting in different periods of time, and provide reference basis for how to reasonably plan data open field and scope, and optimize online service window, etc.

4. Conclusion

Under the background of cloud computing and big data, the current situation and limitations of Chinese e-government development are analyzed in this paper. The system framework of e-government cloud platform based on big data and value co-creation mechanism is proposed, and consequently, the related platform service strategy is proposed, thus to provide new reference basis for improving online government service efficiency and level, reducing platform operation and maintenance cost, and mastering the public needs in real time. Driven by big data technology, the construction of Chinese “internet + government service” cloud platform will have new breakthroughs in the future.

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