Analysis of the Opening Mode of Shandong Provincial Local Government Data Platforms Based on Open Data

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Abstract: The application of big data, computing and other digital technologies provides new opportunities for the governance of our government. Government data opening is the roll booster of government governance revolution in the digital era, summarizes the paths and development modes of open development of local government data, and is helpful to improve the data opening level of local government and promote digital governance process. Taking the construction of the digital platform of Shandong Province prefecture-level government as an example, it analyzes the mode and data quality of the construction of the governmental data opening platform of Shandong Province, proposes to build a provincial-level big data construction management platform, designates relevant policies, regulations and standards, optimizes platform applications, improves data quality, and realizes the new era characteristics of data empowering government governance.

1. Introduction

Under the background of the improvement of the information technology level and rapid development of society and economy in the new era, cloud computing, big data, artificial intelligence and other data storage and processing technology is developing rapidly, providing technical support for effectively processing government department data. Government departments collect and store a large amount of data in the process of performing administrative functions, managing public affairs and solving public problems. Government data opening can both improve the transparency of government governance and help all fields in society efficiently and widely use data to create greater economic and social value. Data resource opening and information application are devoted to promote the modernization of the national governance system and governance ability, as well as are a key to promote digital economy development and economic transition, which are of great significance for building a digital government and service-type government. In 2015, National People's Congress and Chinese People's Political Consultative Conference raised, "The data held by the government should be made public. Except for those involved in secrets according to law, the data should be made public as much as possible to facilitate cloud computing enterprises to serve the society as well as government decision-making and supervision." The proposal emphasized the need to expand the scope of active disclosure, build and improve Internet information disclosure platforms, and improve the standardization of information resources.

As the biggest data producer, the government holds large amounts of quality data. The rapid development of cloud computing, big data, artificial intelligence and other data storage and processing data technologies can efficiently process mass data of public departments such as government, and more efficiently and conveniently solve public problems. The development of digital technologies such as Internet shortens the distance between the citizens and the government and widens the bridge of trust between the two. Making government data public helps the public know and supervise the solution strategies of government departments and improve government information transparency and credibility. "China Open Data Index in the Second Half of 2020" and the Report on China's Local Government Data Opening in the Second Half of 2020 produced by the Digital and Mobile Governance Laboratory of Fudan University were officially released. Till October 2020, 142 provincial, sub-provincial and prefecture-level governments in China had released online data opening platforms. Compared in the second half of 2019, 4 provincial-level

platforms and 36 prefecture-level (including sub-provincial) platforms were increased, and the total number of platforms increased by near forty percent.

2. Literature Overview

At the beginning of 2016, a large number of provincial and municipal government data open platforms were formally presented to all walks of life, which also attracted scholars' research interest. Chen Dequan, Zhu Xin (2021) built a "government-society" dual information power transfer model, from the government-led information disclosure to the gradual transfer of information power to the society to the open sharing of data rights, which reflects the contraction of government information power and the expansion of public information power. Some scholars researched the development modes and influential factors of the local government data opening platforms. From the perspective of system logic, Shangguan Lina, Wei Chen (2021) used the fuzzy set qualitative comparative analysis method to analyze the performance of government data opening in 20 provinces. The top-level design and basic preparation, data utilization and convenience interaction are the key factors that affect the performance of China's provincial government data opening.

Local government data opening is in the development stage. Its development mode and framework still need to be improved. Local government data opening includes multiple subjects of policy, platform, data, and technology. Some scholars research its platform modes and construction. Based on the two government open data evaluation frameworks of "Open Data Barometer" and "Open Data Index" of existing evaluation projects, combined with China's local conditions, Zheng Lei, Gao Feng (2015) established an evaluation framework of four aspects of environment, data, use and influence and 13 dimensions to evaluate the comparative analysis of open government data construction in 7 places, believed that there were shortcomings such as small data value, relatively closed data, and put forward policy recommendations in terms of data practice. Zhu Xiaofeng, Sheng Tianqi (2021) built a government data opening platform assessment model from the perspective of service contact, comparatively analyzed 10 problems found from national government data opening platforms and raised corresponding solutions.

According to the Report on Government Data Open Research in the second half of 2020, the ranking of the provincial government data open platforms of Zhejiang, Shandong, Guizhou, and Guangzhou was 1st, 3rd, 4th, and 5th at the provincial level. In the prefecture-level (including sub-provincial level) rankings the government data open platform of Shenzhen City ranked first, and the prefecture-level government data open platform of Shandong Province totaled 10 cities and ranked among the top 20. Through vertical comparison of three-year data reports, the provincial and prefecture-level local government data open platforms of Shandong Province have achieved significant results. Based on the existing literature research results, this paper analyzes the data open platform of Shandong Province, summarizes its development advantages, conducive to promoting the transformation of regional government governance ability, and exploring the path optimization of the government data open platform construction.

3. Status Quo the Construction of Local Government Data Open Platforms of Shandong Province

In 2018, Shandong Provincial Government established a big data bureau to be in charge of the e-government, digital government construction, etc. of the whole province. Significant achievements have been obtained till now. Shandong Public Data Open Network (http://data.sd.gov.cn/) is sponsored by the Shandong Big Data Bureau and undertaken by Shandong Provincial Big Data Center. Up to November 2021, the Data Open Platform opened 51 departments, 140,000 data catalog, 3.71 billion pieces of data, 71,000 data interfaces and 105 innovative applications. Shandong Public Data Open Network contains provincial data (provincial departments) and 16 prefecture-level data, which is a comprehensive data open platform. Among 105 data applications, health (29), people's livelihood (19) and transportation (16) are among the top three,

all of which are closely related to current social life. The platform provides map service, including the evaluation of tourist star-rated hotels in Shandong Province, information on provincial cultural relics protection units in Shandong Province, and information on Shandong Provincial Museums. Shandong Public Data Open Network has a total of 380,000 platform visits. Statistics can provide information on the geographical distribution of users, statistics on data usage, and statistics on popular tags. The website provides an interaction and exchange platform. You can apply for data demand, problem feedback, consulting and questioning and other online communication services. It opens the ecological sector to provide relevant activities in three parts: innovation platform, event salon, and digital innovation competition, providing citizens with opportunities to understand, apply, and innovate data technology.

Shandong Province has built prefecture-level government data open platforms in an all-round way. All cities have built independent open data platforms, including a total of 16 prefecture-level government data open platforms. The basic structure is consistent with the provincial government data open platform, including 7 branch projects such as data catalog, API, data application, map service, open index, interactive communication and developer center. The website design and the project types are similar to the provincial website, which refelects the overall planning policy of Shandong Province. According to the comprehensive ranking of the Report in Data Index, Qingdao City (No. 3), Jinan City (No. 5), Weihai City (No. 8), Rizhao City (No. 11), Yantai City (No. 13), Weifang City (No. 4) and Zaozhuang City (No. 15) and another 9 cities are in the ranking. The provincial and municipal platforms have been mutually connected, and the data of the municipal platforms can be aggregated on the provincial platforms, thus fully realizing the sharing of government data between provinces and cities.

Table 1 List of Prefecture-Level Government Data Opening Platforms in Shandong Province

	Platform name	Platform overview
1	Jinan Public Data Open Network http://data.jinan.gov.cn/	1 Data catalog: 19 fields, 60 municipal departments, 15 districts and counties 2 Data applications: 32 applications
2	Qingdao Public Data Open Network http://data.qingdao.gov.cn/	1 Data catalog: 19 fields, 46 municipal departments, 10 districts and counties 2 Data applications: 25 applications
3	Zibo City Public Data Open Network http://data.zibo.gov.cn/	1 Data catalog: 18 fields, 48 municipal departments, 11 districts and counties 2 Data applications: 20 applications
4	Zaozhuang City Public Data Open Network http://zzdata.sd.gov.cn/	1 Data catalog: 18 fields, 46 municipal departments, 7 districts and counties 2 Data applications: 18 applications
5	Dongying City Public Data Open Network http://data.dongying.gov.cn/	1 Data catalog: 18 fields, 50 municipal departments, 7 districts and counties 2 Data applications: 19 applications
6	Yantai City Public Data Open Network http://data.yantai.gov.cn/	1 Data catalog: 19 fields, 53 municipal departments, 14 districts and counties 2 Data applications: 47 applications
7	Weifang City Public Data Open Network http://data.weifang.gov.cn/	1 Data catalog: 23 fields, 42 municipal departments, 17 districts and counties 2 data applications: 5 applications
8	Jining City Public Data Open Network http://jindata.sd.gov.cn/	1 Data catalog: 18 fields, 57 municipal departments, 14 districts and counties 2 Data applications: 94 applications
9	Tai'an City Public Data Open Network http://tadata.sd.gov.cn/	1 Data catalog: 22 fields, 27 municipal departments, 7 districts and counties 2 Data applications: 24 applications
10	Weihai City Public Data Open Network http://data.weihai.gov.cn/	1 Data catalog: 25 fields, 83 municipal departments, 8 districts and counties 2 Data applications: 43 applications
11	Rizhao City Public Data Open Network http://rzdata.sd.gov.cn/	1 Data catalog: 18 fields, 50 municipal departments, 6 districts and counties 2 Data applications: 116 applications

12	Binzhou City Public Data Open Network http://data.binzhou.gov.cn/	1 Data catalog: 23 fields, 48 municipal departments, 7 districts and counties 2 Data applications: 12 applications
13	Dezhou Public Data Open Network http://dzdata.sd.gov.cn/	1 Data catalog: 18 fields, 47 municipal departments, 12 districts and counties 2 Data applications: 11 applications
14	Liaocheng Public Data Open Network http://lcdata.sd.gov.cn/	1 Data catalog: 18 fields, 32 municipal departments, 10 districts and counties 2 Data applications: 10 applications
15	Linyi City Public Data Open Network http://lydata.sd.gov.cn/	1 Data catalog: 18 fields, 35 municipal departments, 12 districts and counties 2 Data applications: 40 applications
16	Heze City Public Data Open Network http://hzdata.sd.gov.cn/	1 Data catalog: 18 fields, 34 municipal departments, 11 districts and counties 2 Data applications: 10 applications

3.1 Preparation

Readiness is the foundation of open data, which includes three aspects: the effectiveness of regulations and policies, organization and implementation, and the formulation of standards and specifications. Regulations and policies are the legal basis and important basis for promoting government data opening. The promulgation of laws and regulations has further consolidated the legal basis for data opening. Organization and implementation is the organizational guarantee and promotion implementation of the government data open work. The formulation of standards and specifications is conducive to the promotion of standardization of data open work. The regulations, policies, standards and specifications related to the opening of government data in Shandong Province have realized the development trend of gradually landing from scratch. Relevant implementation planning and polices are appointed: Yantai Three-year Action Plan on Promoting Digital Economy Development, Digital Yantai 2021 Action Scheme, Qingdao Public Data Opening 2021 Work Plan, Qingdao City Service Data Empowerment Tackling Action Scheme Released, Jinan Public Data Open 2021 Work Plan, 2020 Jinan Municipal Public Data Sharing Responsibility List and Public Service Enterprise Data Resource Open List Release. Standards and specifications on data opening are formulated: Interim Regulations on the Open Management of Public Data in Zaozhuang City, Interim Measures on the Open Management of Public Information Resources in Linyi City, and Interim Regulations on Public Data Opening in Dezhou City. The five cities of Weifang, Dongying, Zibo, Heze, Binzhou, and Tai'an have not appointed any policies and regulations on government data.

3.2 Data

The quantity of government departments releasing data can reflect the scope of construction of government data open platforms. The more the government departments are, the more standardized platform construction is. The construction of government data open platforms is mainly oriented to the needs of other social organizations and citizens. It is a department closely related to the corporate sector and the lives of citizens, involving education, technology, economy, trade, industry, public safety, social security and employment, health and safety, ecological environment, transportation, and many other fields. There is a large gap between the opening departments of the municipal governments in Shandong Province. Weihai City, Zibo City, and Jining City have the highest coverage rates, with 99, 77, and 70 respectively, while Liaocheng only has 32 departments. From the perspective of data opening, Shandong Province is the only province in China that basically realizes the three-level data openness of provinces, cities, districts and counties. There are more than 40 government departments at the same level that are connected to the city-level platform, displaying a trend of descending to the districts and counties. Except for Zaozhuang City, the remaining 15 cities have achieved data opening for all subordinate districts and counties.

Data quantity is mainly measured from three aspects: the number of API interfaces, data catalogs

and total data of the prefecture-level government data open platforms. The total quantity of data embodies the digital level of the local government's big data government services. There is a large gap in the quantity of data of open data platforms of prefecture-level governments in Shandong Province. Jining and Binzhou contain 400 million pieces of data, while Tai'an has only 6.18 million pieces of data. The API interface and data content reflect the degree of data sharing of the open data platform and the level of digital government construction to a certain extent. Yantai City and Weihai City provide many API data interfaces. The number of data interfaces of Zaozhuang City is quite different from other cities, only 396. Appropriate increase of API interfaces will help the public to obtain data information more conveniently. Data opening covers about 20 fields such as education and technology, culture and leisure, comprehensive services, health, and market supervision. Most of them are prefecture-level platforms with a wide range, which can meet the various data needs of the society and the public. In the process of building a digital government in Shandong Province, a government data opening system with full coverage, wide scope and multi-level has become increasingly mature and perfect.

Table 2 Data of Prefecture-Level City Government Data Open Platforms of Shandong Province

Prefecture-level city	API/piece	Data catalog /piece	Data/ ten thousand pieces
Jinan	4037	9388	3664
Qingdao	5303	9356	6269
Zibo	1991	9335	676
Zaozhuang	396	7372	1543
Dongying	2249	6196	4299
Yantai	12307	13304	7789
Weifang	6295	7926	2458
Jining	1359	14049	40000
Tai'an	2947	9237	618
Weihai	8558	11537	16000
Rizhao	1163	6202	10000
Binzhou	7523	11594	40000
Texas	3211	6733	10000
Liaocheng	5278	7632	4666
Linyi	3617	10517	10000
Heze	3242	5995	964

4. The Experience of the Prefecture-Level Government Data Open Platforms in Shandong Province

Shandong Province Government Data Open Network covers and contains 16 prefecture-level government data open platforms, with unified construction mode. Shandong Province has realized data channels between provinces and cities. Shandong Province has obtained certain achievements in policy formulation, organization and implementation, data quantity, data coverage, application effect and other dimensions. There is much experience to learn from.

From polices and regulations to the implementation plans, most of our provincial and prefecture-level governments have achieved the function of preparation layer. However, from the perspective of laws and regulations, the legislation system of government data opening has not been perfect at present. Government data opening involves in multiple stakeholders. The relationship of rights and interests between each other requires more clear legal restrictions. At the same time, the public value and economic influence of data opening need to be clarified. Actively learn from the provinces and cities that have produced excellent results. For example, Shandong Province formulated and released a series of guidance work such as the Shandong Province Public Data Opening Measures Regulations (Draft for Solicitation of Comments). Prefecture-level governments of Shandong Province released opening plan-related policies to increase the emphasis on government data opening, include data opening in government work plans and specify annual opening goals, fields to be opened, improvement of platform construction and other work.

From the perspective of data, prefecture-level government data covers health, social security,

transportation and other related activities closely related to social life. 21 categories are stipulated by the Shandong Province Big Data Bureau and deleted by the prefecture-level governments according to the local situation. Provinces and cities may formulate data policy index of data opening platforms and increase API interfaces to better meet social needs according to the local social development. Government data opening is oriented by market, develops quality service platforms, increase data opening of featured fields of prefecture-level governments, speeds up improving platform functions, uses opinion feedbacks, need application and other functions to clarify the key work of data opening, and formulate specific plans. It should strengthen the linkage mechanism between provincial and municipal data opening platforms and form an information sharing, linkage mechanism between departments, governments and enterprises. It should strengthen the rapidness and usefulness of government data information, formulate related government data opening management regulations, clarify the updating time and updating frequency of data information, make timely response and timely reply in unexpected public events and avoid information barrier through public supervision. It should strengthen the cultivation of data talents, encourage relevant departments to conduct training and practicing, cultivate professionals for data technology and lay a solid foundation for the national governance system and governance ability modernization.

Government data opening is not a single, independent individual. It requires multi-stakeholders of various sectors of society and organizations to jointly plan and promote. According to the data opening space diagram in the Report, there is a large gap in the government data opening progress between provincial and municipal governments of China. Many prefecture-level governments have not opened the government data opening platform; less than a half of provincial governments opened the platform. From the perspectives of preparation and data, this paper takes the construction of prefecture-level government data platforms in Shandong Province which have obtained achievements and analyzes the highlights of Shandong Province government data opening work to provide reference for other provinces and cities' construction of government data platforms and provide powerful guarantee for realizing digital government governance.

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