

Research on the Application of Power Data in Digital Government Construction

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Abstract. Promoting the deep integration of power data and government governance can effectively help power enterprises to provide more help for government decision-making and industry management. Studying the application of power data in the construction of digital government helps to continuously enrich the application scenarios of power data and promote the construction of digital government. First, clarify the main functions of the government and the value creation model of power big data; Secondly, from five government functions to explore the application of power data in them. It is found that by making full use of internal and external information to build models, power big data can effectively help the government play its functions. The research prospect is put forward in order to form a standard paradigm for further popularization and application.

Keywords: Power data; Digital government construction; Application scenario

1. Introduction

With the support of the new generation of information technology, digital government further optimizes the organizational structure, operation process and management services within the government by establishing new mechanisms, new platforms and new channels driven by big data, and comprehensively improves the government's ability to perform its duties. It is to build a modern government management model of "using data to communicate, use data to make decisions, use data to serve, and use data to innovate" ^[1]. As a new model of national governance, the transformation of digital government is manifested in three aspects: first, "network" and "information"; The second is to "precision" and "intelligent" development; Third, the "flattening" and "multi-centralization" of information dissemination ^[2]. Power big data is a large set of structured, semi-structured and unstructured business data collected through various data collection methods, such as sensors, smart devices, and mobile terminals^[3]. These data are mainly from power generation, transmission, transformation, distribution, power consumption and dispatch.

The power data business marked by "electricity for economy" and "dual carbon governance" has played an important role in helping the government to promote the modernization of urban governance system. The full use of power big data can achieve fine management inside the power grid and achieve better urban governance outside ^[4]. Therefore, this paper first explains

the value creation mode of power big data and the main functions of the government, and then analyzes the application scenarios of power data in the construction of digital government from five fields on this basis, which is conducive to continuously enriching the application scenarios of power data.

2. Power big data value creation model based on government functions

2.1. Main functions of the government

In 2022, The State Council officially issued the Guiding Opinions on Strengthening the Construction of Digital Government, which made detailed deployments in seven aspects: improving economic regulation capacity, market supervision capacity, social management capacity, public service capacity, ecological and environmental protection capacity, government operation efficiency, and government openness level. Its main functions are shown in Figure 1.

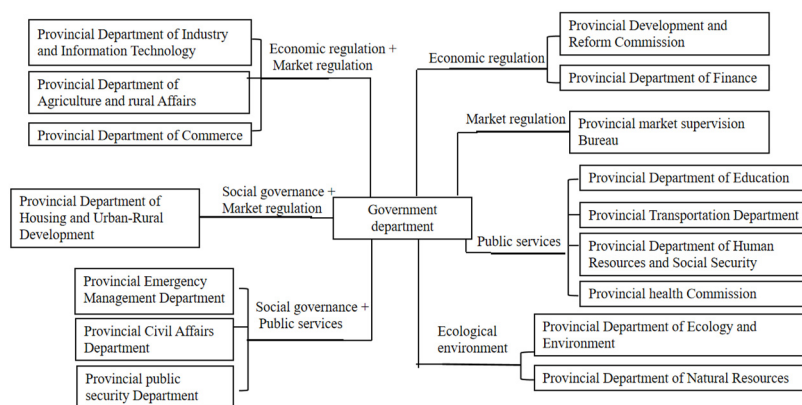


Fig. 1. Main functions of the government

Data from the policy document

2.2. Power big data value creation model

From the source, power data is divided into internal data and external data, including power generation, transmission, distribution and other aspects of the internal data; External data comes mainly from the social and public services sector. For different data, according to the combination of internal and external services, the formation of integrated sharing, data opening, auxiliary decision and value co-creation four modes. First, the power enterprise data integration into the big data platform; Then the information such as the user's use of electricity is open to the society; It is then combined with external data to help companies make decisions. Finally, with the development of the Internet, power enterprises understand the needs of users and constantly adjust services, so as to achieve value co-creation between supply and demand^[5].

3. Application of power data in government functions

3.1. Economic regulation

Electricity is closely related to the economy, and electricity demand is a "barometer" of economic growth to a certain extent, among which the whole society's electricity consumption is the most core indicator for domestic and foreign researchers to track and observe the national macroeconomic operation. At the same time, judging the growth trend of electricity consumption from the economic trend has become an important means for government departments and power enterprises to forecast power demand. Figure 2 shows the annual growth rates of GDP and electricity consumption from 2011 to 2022. As can be seen from the table, the change trend of both is roughly the same, when the economy is down, the electricity consumption is also reduced accordingly; Moreover, the growth rate of electricity consumption has been lower than the growth rate of gross domestic product, which can also judge the effectiveness of energy conservation and consumption reduction. In short, from the power data can observe the economic trend, from the economic trend can also predict the power demand, the two have a close relationship.

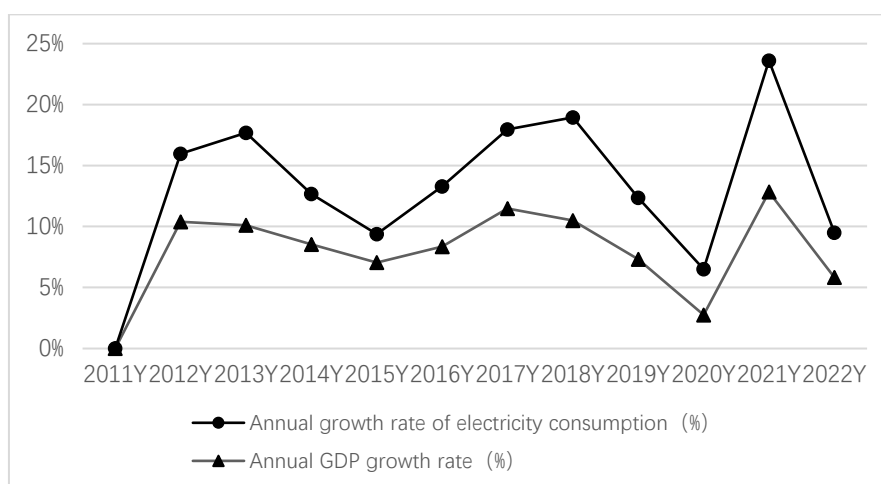


Fig. 2. Comparison of electricity consumption growth rate and GDP growth rate from 2011 to 2022

Data source: Electric check

3.2. Market supervision

Applications in the field of market supervision include enterprise credit evaluation, help small and micro enterprises financing and enterprise operation risk early warning.

The 2022 Government Work Report proposes to expand the coverage of government financing guarantees for small, medium-sized and micro enterprises, and promote the solution of the real economy, especially the financing problems of small, medium-sized and micro enterprises. However, the credit rating of small, medium and micro enterprises is generally not high and the collateral is less, resulting in a low approval rate of loans. Therefore, the power credit

information products comprehensively evaluate various data information of enterprises, screen out high-quality enterprises, and finally generate a comprehensive evaluation report on enterprise power credit, help banks and other financial institutions to examine the credit situation of enterprises from a new dimension, and assist financial institutions to quickly approve and issue loans to users. Its evaluation architecture is shown in Figure 3.

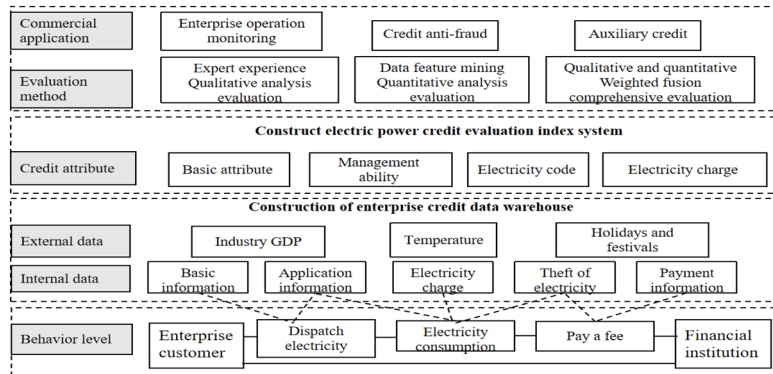


Fig. 3. Enterprise electricity credit evaluation structure [6]

3.3. Public services

Applications in the field of public services include providing power big data public services to the society, smart energy big data service platform, business area economic vitality index, etc.

In the construction of smart cities, the supporting role of power data mining is not limited to ensuring the supply of electric energy, but also efficient sorting of data information, such as power replacement, laying a solid foundation for the development of green cities, and establishing smart planning systems and policies in line with the era of big data [7]. The use of power big data can also solve the elderly care problem. For the elderly living alone in rural areas, the real-time electricity consumption information of the elderly is analyzed, the status of the elderly is displayed as "red code", "yellow code" "green code", and the "non-green code" information is pushed to the grid administrator in a timely manner for verification, accurate portrait, directional" care ", and reduce the work burden of rural grid workers. Its service flow is shown in Figure 4.

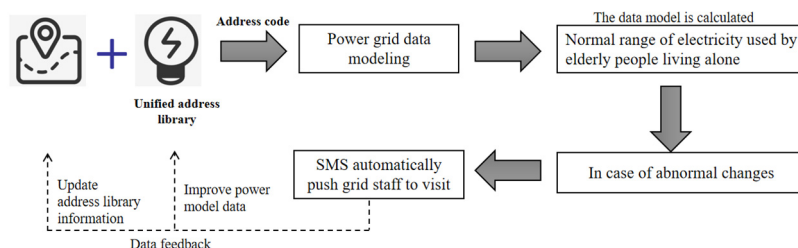


Fig. 4. "Care for the elderly living alone" service process

Data from the Internet

3.4. Social management

Applications in the field of social management include comprehensive power index for rural revitalization, urban and rural coordinated development index, urban auxiliary planning, etc.

In terms of rural revitalization, data such as total electricity consumption of rural residents are used to establish a rural revitalization index model to evaluate the development of rural areas [8]. In addition, a monitoring and early warning platform for poverty-stricken households to return to poverty is established based on big data information such as electricity consumption and payment, and red, yellow and blue early-warning warnings are given to potential poverty-stricken households, as shown in Table 1, which is sent to the municipal and state government cloud platform, and poverty alleviation monitoring departments at all levels are guided to screen, forward, assign, verify and feedback early warning information, so as to eliminate the risks and dangers of returning to poverty in a timely manner.

Table 1. Dynamic monitoring of anti-relapse poverty

Monitoring of suspected poverty-stricken users	Monitoring of industrial users suspected of returning to poverty
1. Long power outage due to arrears (red alert)	1. Abnormal power failure due to overpayment (red warning)
2. Excessive arrears (red alert)	2. Abnormal power consumption trend of industrial poverty-stricken households (yellow warning)
3. Low cumulative daily average electricity consumption and average daily electricity consumption of poor households in the province (red alert)	
4. The cumulative daily average electricity consumption is within the lower 10% of the poverty-stricken households in the province (yellow warning)	
5. The cumulative daily average electricity consumption is within the range of 10%-20% of the poverty-stricken households in the province (blue warning)	

Data from the Internet

3.5. the ecological environmental protection

Applications in the field of ecological environmental protection include carbon emission monitoring, electricity environmental protection index, environmental protection credit evaluation, etc.

"Power big data + dual carbon" [10] business is mainly carried out from four aspects of carbon emission accounting, analysis, monitoring and management, completing a complete closed loop of carbon management and carbon reduction, using smart sensor technology to obtain real-time electricity consumption data [11], and promoting the green and low-carbon transformation of regional economy. At the same time, power data should assist the government in pollution prevention and control from two aspects: monitoring and prevention [9].

For example, the power big data help pollution prevention and control system developed by the State Grid e-commerce company under the guidance of the State Grid Internet Department can use multidimensional monitoring methods to collect electricity consumption data in different

regions and industries, build electricity analysis models, and locate key areas and key industries with pollutant emission and pollution risks. For key polluting enterprises, It analyzes the indicators of electricity consumption, electricity consumption trend and production activity, and helps the government to track and monitor the regional distribution and production electricity consumption of polluting enterprises. By 2021, the system has completed the full coverage of electricity monitoring in 26 provinces, 329 cities and 1957 counties across the country, and has achieved online monitoring of the electricity consumption of more than 160,000 pollutant discharge enterprises, reducing on-site verification by more than 360,000 people/year, and reducing the procurement cost of environmental protection equipment for relevant enterprises by more than 1.5 billion yuan. Of course, the system is still upgrading, actively carrying out the Yangtze and Yellow River basin sewage enterprises monitoring, smart environmental protection power consumption index and other aspects of the work, to further promote scientific and legal pollution control.

4. Conclusions

Through the above analysis of the application of power data in the fields of economic regulation, market supervision, public service, social governance and ecological environmental protection, it is found that big data can be used to depict economic changes and reflect the level of economic operation. Establish a credit rating system for enterprises to help optimize the business environment and financing ecosystem; Construct a comprehensive power index model for rural revitalization to assist the government in formulating relevant policies; Build a data platform to provide people's livelihood information to the government and relevant institutions; And protect the ecological environment. In the future, through the theoretical research on the power data application map, implementation path and guarantee key element system of the empowered digital government construction, the power data application implementation method can be solidified and transformed into a standardized management paradigm of the power data external service digital government construction, so as to provide references for various provincial and municipal companies to carry out the power data application and service digital government construction.

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