

The collaborative strategy of data governance of state-owned enterprises in China

Han Jiaping^{1,*}

¹State Grid Energy Research Institute Co., Ltd., Beijing, China

Abstract. The new transformation spawned by digitization brings a new change in the logic of data governance. In recent years, the state-owned enterprises (SOEs) of China has been strengthening the construction of data governance system, but there are still a series of key issues that need to be solved. It is urgent to carry out research on issues related to data governance, to play the data elements of the amplification, superposition and multiplier effect. This study analyzes the new requirements of data governance in the new situation and the reasons for the non-synergy of data governance of SOEs. Then this research proposes the collaborative optimization strategy of data governance in the SOEs. The main findings of this research are as followed: On the one hand, the reasons for the lack of synergy in the SOEs' data governance are comprehensively analyzed. On the other hand, some key strategies for the optimization of the company's data governance synergy are proposed. For example, this study proposes to build multi-level data governance internal market, design internal market transaction elements, create internal market operation management mechanism, establish internal market performance evaluation and assessment mechanism, and improve the internal market-oriented and efficient operation supporting capacity.

1 Introduction

The Fourth Plenary Session of the 19th Central Committee of the CPC first proposed that data is a new and important factor of production, elevating data to an unprecedented strategic height. The new transformation spawned by digitization brings a new change in the logic of data governance. In recent years, the state-owned enterprises (SOEs) in China continuously strengthened the construction of the data governance system, and the breadth and depth of data management have been continuously expanded^[1]. For example, some SOEs have carried out successful practices in data security management, data quality management, data sharing and organizational structure collaboration and so on. However, there are still a series of key problems to be solved. The most important is that data classification and classification management needs to be strengthened and data governance synergy mechanism needs to be optimized^[2]. It is urgent to carry out research on issues related to SOEs data governance and value-added services under the background of digital transformation^[3], strengthen top-level guidance, speed up the solution of practical problems, promote the implementation of relevant work, and effectively play the amplification, superposition and multiplication effects of data elements.

2 Analysis of the reasons for the non-synergy of data governance of the SOEs

Affected by the traditional system and mechanism, the synergy of data governance is still obviously insufficient, and the model innovation and scenario research and development of data application are not enough^[4], which seriously restricts the SOEs' digital transformation and the sustainable improvement of production and operation quality and efficiency.

First, the data governance objectives in the SOEs of all levels and disciplines are inconsistent. In the horizontal dimension, each professional department has strong departmentalism, and the decision-making about data governance is oriented by the needs of its own professional department, lacking the firm-level overall perspective. In the vertical dimension, the rights and responsibilities of implementing data governance at all levels are different, and the perspective of headquarters and grass-roots units on data governance is different.

Second, the horizontal and vertical data governance organizational structure does not match. In the horizontal dimension, the more professional departments involved in data governance and the more multi-headed management brought by the cross of responsibilities often lead to differentiated governance needs. The greater the demand difference, the lower the efficiency.

* Corresponding author: helenjp@126.com

In the vertical dimension, the form of organizational structure leads to the inequality of capabilities, powers and responsibilities at all levels. The headquarters has too strong control over the grass-roots level, and the empowerment and filling of the grass-roots level are insufficient, which fails to form a two-way feedback linkage.

Third, the collaboration mechanism of data governance within the group is not flexible. The horizontal and vertical collaborative data governance within the firm is not highly related to assessment or incentive, and the resistance of data collaborative governance is large.

Fourth, the cultural atmosphere of data governance does not adapt to the collaborative needs. The cognitive level of collaboration among different disciplines and levels is inconsistent, and the cognitive difference between individuals and organizations is large. The collaborative cultural atmosphere of data governance has not been formed, and the cognitive level of personnel is large, which directly affects the efficiency of data governance.

3 Collaborative optimization strategy of data governance in the SOEs

To improve the synergy of data governance, the SOEs should adhere to the guidance of activating the vitality of organizations and individuals, and adhere to the combination of market economy principles and corporate data governance practices. In the firm, the data transaction subject is designed according to the market principle^[5], the transaction elements are subdivided according to the market mechanism, the price standard of the data elements is verified according to the market rules, the value contribution of the data products is confirmed according to the market rules, and the data governance performance assessment is carried out according to the market method, so as to give full play to the market's regulation mechanism on supply and demand, price, competition, etc., and form an internal market-oriented data governance coordination system with value and market as the core^[6]. Fully stimulate the initiative and data governance driving force of employees at all levels of all disciplines to increase profits and efficiency, and promote all collaborative entities to actively optimize resource allocation, improve data governance activities, actively participate in competition, and improve input and output.

3.1 Build multi-level data governance internal market

Focus on the characteristics of corporate data governance, design and build a three-level data governance internal market with full professional coverage and multi-level penetration. Adopt the embedded method to integrate the internal market function of data governance with the firm's operation and management organization structure and management level, integrate the standard system management, price

management, target management, transaction simulation settlement, information management, evaluation and assessment and other responsibilities necessary for the internal market of data governance, implement the data governance function level by level, carry out market-oriented operation, and connect from the headquarters to the grass-roots level. The transmission channel for improving quality and efficiency from the competent department to the professional department will realize the coverage of data governance activities to the end, the extension of data governance responsibilities to the edge, and the transmission of corporate data governance objectives to the grass-roots level through the market transaction system, so that everyone can be in the market, participate in the market, give full play to the subjective initiative of data governance, and improve the overall effectiveness of corporate data governance by improving the quality and efficiency of personal data governance.

3.2 Designing internal market transaction elements

To build the internal market of data governance in the SOEs is to put all the implementation entities, service entities and management entities in the whole business chain and value chain of the firm's data governance into the market, and fully evaluate the input and output of each data governance business and the value contribution of each data governance entity according to the market mechanism. The key and difficult point for the SOEs to build the data governance internal market is to design the market transaction elements, that is, to determine the transaction subject and object according to the principle of comprehensive and level-by-level coverage of data governance activities, and to design the data governance market price system according to the principle of fair market transaction value.

3.2.1 Sorting out the whole business and establishing the main body of internal market transactions.

The main body of the internal market transaction is the carrier to realize the data governance market transaction. The SOEs need to summarize the positioning of all levels and units in the data governance value chain, put all units of the firm's internal market at the three levels of data governance into consideration of the market environment. Meanwhile, the SOEs need to divide them into three types of data governance market transaction entities: data management, data application, and support services. Then it is important to respectively identify the demanders at the back end of the data value chain and the suppliers at the front end of the data value chain, and establish a full-caliber internal market transaction entity for data governance^[7].

- Data management subject: provide data to all departments and units within the firm system, and provide data products or services to external units. Based on the professional business operation

accumulation and governance data, external data is introduced through compliance channels.

- Data application subject: provide data products or services internally or externally by using the data of the discipline or integrating the data of each discipline and unit in the system.
- Support service subjects: mainly provide data governance support services to internal units, and some support units provide market-oriented data governance services externally. It mainly purchases various materials and services related to data governance from external suppliers.

3.2.2 Total value decomposition which defines the transaction object of the internal market.

The internal market transaction object is the data products and services provided by the data governance transaction subjects, including both the data products and services provided externally and the data governance support services provided internally. In the process of defining the transaction object of data governance, the SOEs can directly manage the data products and services provided externally as the transaction object of the internal market at all levels; The data products and services provided internally are the focus of the internal market management. According to the principle of comprehensive coverage, they are sorted and identified from top to bottom, the business essence is analyzed item by item for specific data governance activities, and the measurement method and resource input are determined, covering all links of the complete value chain of corporate data governance.

3.2.3 Operating the whole market and designing the internal market price system.

The first step is to determine the internal market pricing model. The SOEs should check and approve the price of all activities in the whole value chain of data management, data application and support services in a fair and fair manner, with reference to the market pricing rules, to ensure that the simulated income can be compared horizontally among all disciplines and units, and vertically within the same unit's historical period, and complete the check and approval of the whole transaction price of data governance^[8], as the basis for calculating the value contribution of data governance at all levels. Among them, for data products or services provided to external markets, since they have been priced and provided externally, the current price provided externally is directly taken as the price of external data governance activities, and adjusted synchronously according to the change of the actual price provided externally.

For internal data governance transactions that can directly obtain external market pricing standards, the external market pricing is directly quoted as the basis for data governance business pricing to truly quantify the contribution level of data governance marketization value. Access to external market pricing standards for

data governance includes: external market quotations, relevant national regulations, relevant industry standards, and relevant group standards.

For the data governance internal transactions that cannot obtain the relevant external reference price, the method of comparing the market cost pricing is adopted to calculate and verify, that is, according to the historical workload and resource input, the resource input level of the unit data governance workload is calculated as the internal pricing basis.

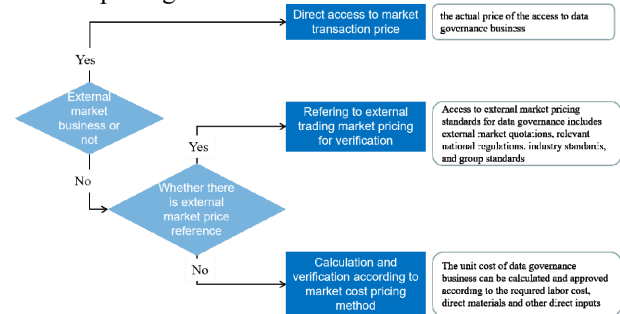


Fig. 1. Internal market price setting standards for data governance

The second step is to determine the measurement method of internal market transactions. The SOEs need to analyze from multiple perspectives such as workload, revenue and cost, value contribution, etc., distinguish specific situations, and determine the measurement method of internal market transactions in data governance, as the basis for internal transaction rules and accounting.

(1) Measurement method of market transaction volume

It mainly includes: repetitive operations, with the number of operations as the business volume; For data services that are royalty based on the established amount, the business volume is based on the business royalty base; If it is difficult to identify the business volume of some project businesses and daily support work, the actual business volume shall be confirmed according to the schedule.

(2) Revenue determination method

Data governance income =

$$\sum \text{Market price of each business} \times \text{Business volume} \quad (1)$$

The recognition scope of internal market transaction revenue of data governance includes all value output of various transaction entities, including all internal and external market revenue, and truly reflects all data governance output. Among them, the external market revenue of data governance has been recorded in the accounting system of various disciplines and units, and can be directly referenced. The internal market revenue of data governance is not reflected in the accounting system of each specialty and unit, and needs to be calculated and confirmed based on the business volume and business price provided by each market entity.

(3) Cost determination method

The confirmation scope of transaction costs in the internal market of data governance includes all resource consumption of various transaction entities, including all

internal and external market costs, and truly reflects all inputs. Including:

The cost of external procurement has been recorded in the accounting system of each discipline and unit, but the accounting payment of some costs does not match the actual consumption, and is restored according to the resource consumption and other drivers.

The internal procurement cost is not reflected in the accounting system of each discipline and unit, and needs to be recalculated and confirmed. The overall internal procurement cost is equal to the internal revenue, and is confirmed and allocated according to the data governance service object. When the internal data governance business serves a single discipline or unit, the internal data governance business cost (Idgbc) is calculated according to the following formula:

$$\text{Idgbc} = \sum (\text{Business acceptance} \times \text{Business price}) \quad (2)$$

When the internal data governance business supports the public production link and serves multiple disciplines or units, it is confirmed according to the resource consumption drivers of each power supply unit.

(4) Measurement of value contribution

After the recognition of income and cost, various unit value contributions are measured in the following ways:

For the data application specialty or department, data governance value contribution (Dgvc) is calculated as the following:

$$\begin{aligned} \text{Dgvc} = & \text{External market revenue} - \text{Own operating costs} \\ & - \text{Internal business costs} \\ & - \text{other external public business costs that should be borne} \end{aligned} \quad (3)$$

For the data management specialty or department and supporting service unit, data governance value contribution (Dgvc) is calculated as the following:

$$\begin{aligned} \text{Dgvc} = & \text{External market revenue} \\ & + \text{Internal revenue} - \text{Own operating cost} \end{aligned} \quad (4)$$

The third step is dynamically optimize internal pricing standards and the accounting method. For each data governance transaction object, it is necessary to collect the data governance cost accounting through the internal order method, and implement the cost item by item, level by level, and unit by unit to the post and person. It will improve the two-dimensional statistical method of data governance costs, including vertical statistics to business items and horizontal statistics to accounting subjects, and monitor the progress of business costs in real time to truly reflect the consumption level of data governance costs. Through continuous collection and accumulation of information by business, grasping the change trend of business costs, regularly optimizing data governance pricing standards, it will promote pricing standards to become more reasonable, scientific and practical.

3.3 Creating internal market operation management mechanism

First, it is to sort out the application scenarios and implement the cost control of the whole scene. The cost control under the internal market-oriented management system of data governance is based on the data application scenario and is carried out around the measurement method of data governance value of each unit. Compared with conventional cost control, it has completely changed from preparing cost "data" to sorting out "scenarios", focusing on the truthful reflection of the value contribution of internal transaction "scenarios". It is important to consider both external and internal application scenarios, both input and output, external procurement costs and internal resource consumption.

Second, it is to carry out simulated settlement and implement coordinated operation of the internal market. The data governance internal market business contact person is specially set up. On the premise of determining the transaction content, transaction scale and business price, the data governance transaction activity category is identified, the business value volume is confirmed, the addition and change of the business activity is confirmed, all the business volumes of the current month are summarized, the settlement form is issued and filled out, and submitted to the superior professional competent department for review, and then submitted to the financial department after confirmation. The financial department calculates the internal market revenue of data governance and allocates the internal market cost based on the determined business volume and the corresponding internal transaction price. It is vital to improve the internal market operation process of data governance through a simple and efficient simulated settlement method. Business contacts track the progress of business implementation in a timely manner, find problems and submit them for solution, and effectively improve work efficiency.

Third, it is to trace the source of monitoring and establish a process result reporting mechanism. Real-time reflection of internal market operation is an important support for corporate data governance decisions. The SOEs need to establish a management reporting mechanism for the operation process of the internal market of data governance through multiple channels, and reflect the internal market situation, target progress, coordination difference comparison and benchmarking of data governance at all levels in real time through the establishment of a normalized regular reporting system. At the same time, the internal market operation results of data governance should be traced back to the source in a timely manner, the process monitoring should be emphasized, and the problems found should be reflected to the specific responsible person layer by layer. In an open and transparent way, the advanced should be encouraged, the backward should be urged, and the availability and practicability of the data governance management report should be improved, so as to provide a strong basis for the evaluation and assessment of data governance.

3.4 Establishing internal market performance evaluation and assessment mechanism

The first is value contribution orientation, and implementation of management objective performance evaluation. The evaluation of internal market operation performance of data governance should change the situation of scattered and multi-oriented evaluation indicators of the previous data governance model, and focus on the application value tracking evaluation. Based on the comprehensive evaluation results of multidimensional and multi-level internal market operation performance, it is vital to establish a management goal performance evaluation mechanism with the value contribution of data governance as the orientation and the "double drive" of value objectives and business objectives, and clarify the evaluation criteria. It is necessary to improve the quality and efficiency of data governance by assessing the value contribution of data governance, and ensure the realization of governance objectives by assessing the data governance process.

The second is to implement the tracking at all levels and establish a three-level market responsibility assessment system. The SOEs can establish the "ternary comparison" scoring mechanism for the evaluation of the value contribution of data governance, and set the evaluation criteria for each index according to the "comparison with the target, comparison with the history, and comparison with the benchmark". At the same time that the data governance objectives are decomposed to the provincial, municipal and other tertiary markets, the assessment incentive is implemented to the provincial, municipal and other tertiary markets level by level, the realization of the value objectives is tracked regularly level by level, the completion of the value objectives is measured regularly, and the results are used as the basis for performance evaluation, so that the efforts of the markets at all levels, departments of all units and all employees can be reflected in the data governance value evaluation, and the responsibilities are decomposed layer by layer, and the pressure is transferred layer by layer. The three-level market responsibility assessment system implemented at all levels of rewards and punishment promotes the vitality and efficiency of grass-roots data governance.

3.5 Improving the internal market-oriented and efficient operation supporting capacity

First, it is to comprehensive coverage and establishment of management standard system. The SOEs should improve the internal market management standard system of data governance in an all-round way, and develop the internal market management standard system of data governance covering operation manual, standard process, division of responsibilities, pricing standard, information standard, target template, etc. According to the relevant regulations of the SOEs and the relevant theories of internal marketization, combined with industry characteristics and business characteristics, some SOEs such as State Grid Corporation of China,

China South Industries Group Corporation, China Petroleum & Chemical Corporation, have successively issued and comprehensively revised the guidance, management measures, implementation rules, operation plans and other documents to form a vertically and horizontally orderly, standardized and efficient internal marketization management flow and management system of data governance.

Second, it is to coordinate resources and build a new information system. In order to avoid the duplication of information system construction and system data redundancy, the SOEs need to coordinate information resources, build the internal market information system of data governance based on the existing information system by expanding and enhancing functions, realize online operations such as price database maintenance, budget preparation, market operation analysis, and improve daily work efficiency. Based on the existing business system operation specification, basic data standard, budget preparation and execution specification process, it is vital to design the data governance internal market-related business processing logic model, and realize the internal market basic information management and internal market target budget preparation management. Meanwhile, it is necessary to develop functions such as the establishment, change and maintenance of the internal market price list of data governance, carry out offline simulation calculation and verification of the internal market operation process of data governance, and realize online operation management of the internal market. In addition, developing the auxiliary analysis function of data governance internal market operation, dynamically reflecting the internal market operation in real time, and analyzing and display the value drivers of market entities at all levels online. The internal market management information system of data governance built by coordinating information resources provides a strong support for achieving efficient collaboration and lean transparency in the internal market management of data governance with the minimum investment and the maximum use of the existing system data value.

Third, it is to promote level by level and carry out professional training of concepts. The main responsible person of the SOE needs to publicize and implement the internal market-oriented management concept of data governance from multiple perspectives in the form of reports, speeches, discussions and other forms. The main principals of the grass-roots units actively implement, fully promote the construction of the secondary and tertiary markets of data governance, and drive the internal market management concept to take root, blossom and bear fruit at the grass-roots level. Other specialized departments of the Finance and Human Resources Department organize and carry out professional training and promote it step by step.

4 Conclusion

This research proposes the collaborative optimization strategy of data governance in the SOEs. The main

findings of this research are as followed: On the one hand, the reasons for the lack of synergy in the SOEs' data governance are comprehensively analyzed. On the other hand, some key strategies for the optimization of the company's data governance synergy are proposed. For example, this study proposes to build multi-level data governance internal market, design internal market transaction elements, create internal market operation management mechanism, establish internal market performance evaluation and assessment mechanism, and improve the internal market-oriented and efficient operation supporting capacity.

References

1. Bo, W., Biwu, F., Yajun, W. (2016) Power system transient stability assessment based on big data and the core vector machine. *IEEE Transactions on Smart Grid*,7(5):2561-2570.
2. Bo, H., Chuan, P., Liu, W., et al. (2018) Big data management and application research in power load forecasting and power transmission and transformation equipment evaluation. *Journal of Physics: Conference Series*, 1069(1):1742-6588.
3. Sarsfield, S., Ebrary, I. (2009) *The data governance imperative: a business strategy for corporate data*. IT Governance Publishing.
4. Ke-Zhen, J.U., Wei, Z.Z. (2014) Research on data governance system of power enterprises. *Electric Power Information and Communication Technology*.
5. Levitin, A.V., Redman, T.C. (1998) Data as a resource: properties, implications and prescriptions. *MIT Sloan Management Review*, 40(1):89-101.
6. Mohanapriya, C., Bharathi. K.M, Aravinth, S.S., et al. (2015) A trusted data governance model for big data analytics. *International Journal for Innovative research in Science and Technology*, 1(7):307-309.
7. Sallans, A., Lake, S. (2014) Data management assessment and planning tools. *Research Data Management: Practical Strategies for Information Professionals* (Eds). Ray, JM, pp. 87-107.
8. Song, W., Yuejin, Z., Jun, W., Haifeng, L., Yajing M., Runtong, C. (2018) Research on Characteristics and Value Analysis of Power Grid Data Asset. *Procedia Computer Science*,139(1):158-164.