



# Collaborative Effectiveness Evaluation Model Between Different Business Segments Under Closed-Loop Management System of Large Power Grid Enterprises

Song Xue<sup>(✉)</sup>, Xiaodong Li, Rui Li, Xiaofeng Zhang, and Pengwei Cong

State Grid Energy Research Institute Co., Ltd., Changping District, Beijing 102209, China  
xuesong@sgeri.sgcc.com.cn

**Abstract.** Business types of large power grid enterprises are diversified. Strengthening the coordination of different types of business is of great significance to reduce operating costs, improve business quality and efficiency. It is an important part of the closed-loop management system to build a collaborative effectiveness evaluation model between businesses in different sectors. This paper studies the business collaboration mode between different sectors of large power grid enterprises, constructs a collaborative effectiveness evaluation index system covering strategic planning collaboration, factor resource collaboration and marketing development collaboration, and determines the index weight at all levels based on the key success factor analysis method. Through case analysis, the scientificity and practicability of the model are verified. It is found that the synergy effect of power grid business on financial business, international business, supporting industry and strategic emerging industry is significantly better than that of four types of non power grid business.

**Keywords:** large power grid enterprises · collaboration between different business sectors · closed-loop management system

## 1 Introduction

Large groups are generally divided into multiple business segments according to different regulatory attributes, business support relationships and industrial agglomeration. Each plate often coordinates and cooperates with each other, which has the characteristics of integrity and relevance. In order to strengthen the management and control of businesses in different sectors, assessment objectives are often set for businesses in each sector [1]. Taking the State Grid Corporation of China as an example [2], the power grid business mainly evaluates the asset utilization level, power grid security, service efficiency and operation efficiency, the financial business mainly evaluates the operation efficiency and risk control level, and the international business mainly evaluates the operation efficiency and openness, the supporting industry mainly evaluates the operating efficiency, guarantee support level and innovation development level, and the strategic emerging industry mainly evaluates the operating efficiency and commercial potential.

© The Author(s) 2024

S. H. B. D. M. Zailani et al. (Eds.): ICMSEM 2023, 259, pp. 38–46, 2024.

[https://doi.org/10.2991/978-94-6463-256-9\\_5](https://doi.org/10.2991/978-94-6463-256-9_5)

The cooperation between different types of businesses is of great help to enterprises to reduce operating costs [3]. Through information sharing, enterprises can improve the efficiency of information collection and reduce the cost of information search and acquisition; the establishment of collaborative marketing network can enhance the coverage of sales network and reduce the marketing expenses of each enterprise; strategic cooperation can enhance the trust relationship between enterprises, so as to reduce the transaction cost between enterprises. Evaluating the synergy between businesses in different sectors is an important part of realizing closed-loop management. It is of great significance for timely discovering weak links and formulating targeted improvement strategies.

The business collaboration mode between different sectors of large power grid enterprises was analyzed, the business collaboration effectiveness evaluation model between different sectors based on the key success factor method was constructed, and empirical analysis was carried out.

## **2 Business Collaboration Between Different Sectors of Large Power Grid Enterprises**

Large power grid enterprises mainly involve the collaboration of regulatory and non regulatory businesses. The main principle is to reduce the production cost of a single enterprise and the transaction cost between enterprises through the collaboration of internal resources, including the business collaboration between various departments, the collaboration between different business indicators and objectives, and the collaboration of various resource constraints, enable a single enterprise that cannot obtain economies of scale to obtain the advantages of economies of scale through external cooperation. Taking State Grid Corporation of China as an example, it involves the coordination among power grid business, financial business, international business, supporting industry and strategic emerging industry business.

According to the group management and control theory and diversified operation management theory, for the coordination between different business segments, we should make efforts from the following aspects:

### **(1) Strategic planning collaboration**

Strategic planning collaboration is the core of collaborative development in various business areas of enterprise groups. The development strategy of enterprise group is very important for the enterprise itself. It is the core concept of coordinated development in various business fields. Once the development strategy of the enterprise group is determined, the layout of all subordinate enterprises and business areas of the group should be implemented closely around the strategy and carry out strategic coordination. In addition, the business of each sector should be based on the industrial layout and division of labor positioning, and formulate its own personalized tasks to ensure sustainable and high-quality development.

(2) Element resource collaboration

Factor resource collaboration is the key pillar for the orderly connection and operation of businesses in different sectors, including human resource collaboration, financial resource collaboration, material resource collaboration, information and data resource collaboration, innovation resource collaboration, brand resource collaboration, etc. In the process of collaborative management, all participants share their own resources, make up for the shortage of resources, reduce the repeated investment and idle waste of resources, and improve the utilization efficiency of resources.

(3) Marketing development collaboration

Overall consideration shall be given to resource sharing among branches set up by units in the system in the same region, and a service guarantee mechanism such as shared office space and service resources shall be established to realize joint office. Provide convenient property services and house leasing services to solve the worries for the development of directly affiliated industries. By coordinating the marketing and after-sales work of products or services, effectively integrate the company’s system resources, improve the overall competitiveness and promote the comprehensive and coordinated development of various businesses.

**3 Business Collaboration Effectiveness Evaluation Model Between Different Sectors Based on Critical Success Factor Method**

**3.1 Evaluation Index System of Business Collaboration Effectiveness Between Different Sectors**

According to the business collaboration mode between different sectors of large power grid enterprises and the business collaboration effectiveness evaluation index system between different sectors, three secondary indicators of strategic planning collaboration, factor resource collaboration and marketing development collaboration, as well as 10 tertiary indicators are set, which is as shown in Table 1.

**3.2 Determine the Weight of Indicators at All Levels Based on the Analysis Method of Key Success Factors**

Delphi method and expert scoring method are adopted to determine the importance evaluation matrix of each index [4, 5]:

$$R = \begin{bmatrix} R_1 \\ R_2 \\ \dots \\ R_n \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \dots & \dots & \dots & \dots \\ r_{n1} & r_{n2} & \dots & r_{nn} \end{bmatrix}$$

Among them,  $r_{ij} = \{0,1,2\}$ . If  $i$  factor is more important than  $j$  factor, give 2 points, give 1 point if it is equally important, and give 0 point if it is not important.  $r_i = r_{i1} + r_{i2} + \dots + r_{in}$ , the weight of index  $i$  is  $R_i = r_i / \sum nr$ . The calculated weights of business synergy effectiveness evaluation indicators between different sectors are shown in Table 2.

**Table 1.** Evaluation index system of business synergy effectiveness among different sectors of large power grid enterprises

Primary index	Secondary index	Tertiary indicators	Indicator description	
Business collaboration performance between different sectors	strategic planning collaboration	Implementation of development layout	Key task decomposition, system completeness and penetration level	
		Implementation of development layout	Personalized task formulation of the enterprise	
	factor resource collaboration	Human resource collaboration		Internal selection, deployment and exchange of talents
				Internal selection, deployment and exchange of talents
		Financial resource collaboration		Combination of industry and finance and combination of Finance and Finance
				Combination of industry and finance and combination of Finance and Finance
		Material resources coordination		Reasonable support for material bidding
				Reuse of material resources
		Information and data resource collaboration		Reuse of material resources
				Transformation of supporting business results
	Innovation resource collaboration		Growth rate of cooperative R & D investment	
			Growth rate of intellectual property obtained through cooperation	

*(continued)*

**Table 1.** (continued)

Primary index	Secondary index	Tertiary indicators	Indicator description
			Growth rate of intellectual property obtained through cooperation
		Brand resource collaboration	Promotion and reputation of the company's brand resources in the sector business
	marketing development collaboration	Customer reuse	Promotion and reputation of the company's brand resources in the sector business
			Business performance growth of reuse customers
		Channel borrowing	Business performance growth of reuse customers
			Performance growth of various businesses in composite channels

## 4 Case Analysis

### 4.1 Scoring and Evaluation of Business Synergy Between Different Sectors of Large Power Grid Enterprises

According to the constructed model, the standardized assignment is carried out. The coordination of power grid business to other four types of business (financial business, international business, supporting industry and strategic emerging industry) and the coordination between four types of non power grid business (financial business, international business, supporting industry and strategic emerging industry) are divided into five grades, and the relevant operation data are scored according to the standard score of 1 ~ 5 points, Experts were organized to score 1 ~ 5 for qualitative indicators, and the results are as shown in Table 3.

### 4.2 Effectiveness Analysis of Business Collaboration Among Different Sectors

The full score is 5 points. The final score of the synergy effect of the power grid business on the other four types of business is 3.57 points, and the synergy between the four types

**Table 2.** Weight of business synergy effectiveness evaluation indicators between different sectors

Primary index	Secondary index		Tertiary indicators	
	Indicator name	Index weight	Indicator name	Index weight
Business collaboration performance between different sectors (100%)	strategic planning collaboration	26.9%	Implementation of development layout	19.4%
			Implementation of development layout	7.5%
	factor resource collaboration	38.7%	Human resource collaboration	6.5%
			Financial resource collaboration	6.5%
			Material resources coordination	6.5%
			Information and data resource collaboration	6.5%
			Innovation resource collaboration	6.5%
			Brand resource collaboration	6.5%
	marketing development collaboration	34.4%	Customer reuse	17.2%
			Channel borrowing	17.2%

of non power grid business is 2.371 points. On the whole, the synergy effect of power grid business on the other four types of business is significantly better than that of the other four types of non power grid business, and the synergy between the four types of non power grid business is relatively weak. The synergy gap is viewed by indicators. The comparison of indicators is shown in Fig. 1.

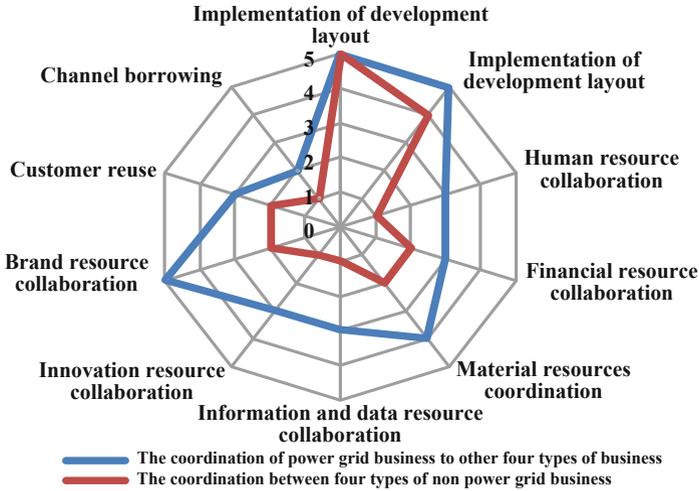
From the perspective of the synergy of the power grid business to the other four types of business, the implementation of development layout, the embodiment of industrial characteristics and the synergy effect of brand resources are good, and the marketing channel support for the other four types of business is the worst. In the future, the reuse of customers should be strengthened, assist the other four business segments and strengthen the promotion of diversified products or services on the premise of ensuring legal compliance. For example, while carrying out power supply services, we should further promote value-added services such as comprehensive energy services and user asset factoring. In addition, we also need to strengthen the reuse of service channels.

**Table 3.** Scoring table of business synergy among different sectors of large power grid enterprises

Primary index	Secondary index	Tertiary indicators	The coordination of power grid business to other four types of business	The coordination between four types of non power grid business
Business collaboration performance between different sectors	strategic planning collaboration	Implementation of development layout	5	5
		Implementation of development layout	5	4
	factor resource collaboration	Human resource collaboration	3	1
		Financial resource collaboration	3	2
		Material resources coordination	4	2
		Information and data resource collaboration	3	1
		Innovation resource collaboration	3	1
		Brand resource collaboration	5	2
	marketing development collaboration	Customer reuse	3	2
		Channel borrowing	2	1

On the one hand, we need to carry out joint office and enhance the utilization of space resources. On the other hand, we need to set up publicity materials and send marketing personnel for the other four types of business in the business hall and other places to promote the performance growth of the other four types of business.

From the perspective of coordination among the four types of non grid businesses, only the implementation of development layout and the embodiment of industrial characteristics are relatively good, and the coordination of other indicators is poor, indicating that the four types of businesses are highly dependent on the main business, but the business complementarity and support among the four types of businesses are not strong, and there is still great potential for resource coordination and marketing development



**Fig. 1.** Business collaboration gap between different sectors of large power grid enterprises

coordination. In the future, the four types of businesses should strengthen cooperation, strive to build a common service platform, realize the sharing of all elements such as customer resources and business channels, greatly improve the efficiency of business expansion, reduce business costs, enhance business competitiveness and enhance the ability of sustainable development.

## 5 Conclusion

The future model can be applied at the group company level to assess the synergy effectiveness between businesses of different types of sectors, find weak links and corresponding responsible subjects, formulate specific incentive and restraint measures, and promote the continuous improvement of synergy effectiveness. In the operation process of various businesses, the corresponding enterprises can use the model to accurately identify the weak links that need to strengthen support with other units, actively seek help and continuously improve their business performance by establishing and improving the normalized coordination mechanism.

**Acknowledgements.** This work was supported by science and technology project of STATE GRID Corporation of China “Research on the company’s strategic closed-loop management and intelligent decision support technology adapted to digital transformation” (1400-202157222A-0-0-00).

## References

1. MA Li, HUANG Liming, XUE Song, FAN Menghua, ZHANG Xiaoxuan. “Key Issues for Orderly Operation of China’s New Electricity Market Reform Pilot,” *Electric Power*, 2017, 50(4): 17–22.
2. LIU Lingbing, SUN Yihong. “State-owned Key Enterprises in action: a multi case study of benchmarking management of state-owned enterprises,” *China Management Accounting Review*, 2021, THEMES (02): 18–26.
3. Li Naiqin, Li Qiang, Chen Huaqiang. “Innovative application of Big data in business collaboration of the postal sector,” *Postal Research*, 2019, 35 (05): 10-12.
4. Gabriel Godofredo Fiuza de Bragança, Toby Daghish, “Investing in vertical integration: electricity retail market participation,” *Energy Economics*, 2017, vol. 67, pp. 355-365.
5. Adriano Bernardo Renzi, Sydney Freitas. “The Delphi Method for Future Scenarios Construction,” *Procedia Manufacturing*, 2015, Vol. 3, pp. 5785–5791.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter’s Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter’s Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

