



# Collaborative Design and Research of Business Expansion Process Based on Sunlight Business Expansion Platform

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**Abstract.** Electric power enterprises have the characteristics of large scale, wide range, many types of users, and scattered users. Along with the electric power enterprise informationization construction gradually thorough, which causes the electric power enterprise marketing system to have complexity, thus urgently needs to solve the coordination question of electric power enterprise's overall function content and the service content. But the business expansion flow coordination design is precisely used to solve the coordination question. Business expansion is an important work in electric power enterprises. Aiming at the problem of long service time and low economic benefit of the business expansion process, this paper studies the collaborative design of the power grid business expansion process based on the sunlight business expansion platform. Firstly, the business expansion process is integrated, and the value-added activities, necessary activities, task processes, and other aspects are automatically integrated to simplify the business expansion process. Then, on this basis, the sunlight Business Expansion Platform is used to collaboratively optimize the business expansion service process and further simplify the business expansion process to realize the efficient service of business expansion process and improve the economic efficiency of enterprises. Through case analysis, it is concluded that the process is more concise, the time limit for the business expansion is higher, and the economic benefit is higher, which has a high promotional value.

**Keywords:** Sunlight Business Expansion Platform; Business Expansion; Process; Collaboration; Design; Research.

## 1 Introduction

Business expansion project (hereinafter referred to as business expansion) refers to the whole process of power supply enterprises accepting customers' applications for a new installation, capacity increase and power consumption change. It determines power supply schemes, organizes the design, construction, inspection, completion, and acceptance of power supply projects, signs power consumption contracts, and finally installs meters and supplies power. For many years, the electric power industry

has had the problems of long installation process, many links and low transparency of charges [1].

However, these problems are also the most important concerns of customers, because they not only directly affect the increase of electricity sales of power supply enterprises, but also are crucial to improve customer satisfaction with the service of power supply enterprises. The implementation of sunlight Business Expansion is conducive to the construction of business expansion projects, which promotes the transparency, openness and marketization of business expansion engineering facilities, design and material supply. The goal of implementing the project is to establish a service platform for customer satisfaction, social recognition and government reassurance. The platform can simplify the installation process and significantly improve the service level. "sunlight Industry Expansion" service is a key work carried out by China SGCC Corporation this year, aiming to provide a convenient, transparent, standardized and standardized business expansion service model and further optimize the business environment.

In order to adhere to the justice, fairness and openness of business expansion projects, China has carried out the transparent construction of business expansion projects and standardized the specific implementation of business expansion project management. The implementation of sunlight Industry Expansion is conducive to the construction of industry expansion projects, promoting the transparency, openness, and marketization of the implementation, design and material supply of industry expansion projects [2]. The goal of the project is to establish a service platform for customer satisfaction, social recognition, and government reassurance. It can reform the traditional business expansion process, improve service quality, shorten the implementation time of the project, and ensure the safety, economy and reliability of the project implementation.

The construction process of the electric power enterprises takes a long time and consumes a lot of money. The generated electricity is difficult to store, which makes the electric power enterprises in a disadvantageous state of "large investment, small return" [3]. Therefore, the user business expansion process must be reasonably planned to ensure the quality and progress of the business expansion project, and improve the economic efficiency of the enterprise while ensuring the quality of business expansion [4]. The platform uses the Internet to provide online interaction and information sharing services for users, enterprises, and service providers.

The specific process of business expansion is different due to different construction projects. The low-voltage business expansion process of a power supply company in China is as follows: application acceptance; determination of power supply scheme; completion inspection; power consumption inspection; signing of power supply and consumption contract with customers; meter installation and power connection; data management. The process of changing the company to "one meter for one household" is as follows: the individual household applies; the business hall registers and asks the schemer to formulate the power supply scheme and make the corresponding project budget; the construction unit completes the construction within 10 working days; the construction unit submits the completion report to the power supply station, and the power supply station signs an endorsement contract with the customer; the business

hall submits the customer information to the relevant departments to establish a card and open an account [5]. In a word, the general process is as follows: first, the user reports the above power demand in the system, and the power supply unit knows that the customer has user demand, and then collects the relevant information of the user to check whether it meets the conditions of telegraph installation, and then accepts it in the next step. Information to be known includes: power consumption capacity, unit information, business license, physical certificate, land certificate, qualification, capacity list of electrical equipment, etc.; power supply scheme; design review; intermediate inspection; completion acceptance; signing of power supply contract; Meter installation and power transmission.

From the specific process, we can see that the process can be further simplified. This requires the sunlight Business Expansion Platform, which can integrate business expansion service resources, simplify business expansion process, shorten business expansion process processing time, and then improve the business expansion time limit compliance rate [6]. Therefore, based on the platform of Sunlight Business Expansion, this paper studies the collaborative design of business expansion process to improve the economic benefits of electric power enterprises in a real sense.

## 2 Collaborative design of power grid business expansion process

### 2.1 Integrate the business expansion process

In the daily operation process of electric power enterprises, the investment is large, the income is small, and the risk is low. Thus, it is not easy to realize the innovation of the business expansion process [7]. Therefore, based on the in-depth analysis of the business expansion process, this paper integrates the existing business expansion activities [8]. In this paper, the business expansion process is divided into three stages, namely the pre-sale stage, the in-sale stage and the after-sale stage. The business expansion service stage is shown in Figure 1 below.

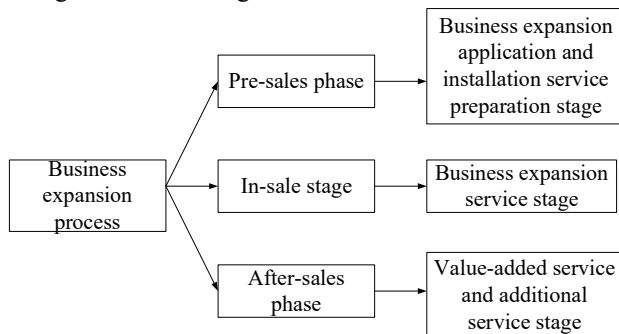


Fig. 1. Business expansion service stage diagram

As shown in Figure 1, the pre-sales stage is mainly the preparation stage of the business expansion service. The in-sales stage is mainly the business expansion service stage, and the after-sales stage mainly includes value-added services and additional service nodes [9]. In the business expansion service phase, the non-value-added activities are eliminated, the remaining activities are simplified, and then the simplified activities are integrated to make the whole process more coherent [10]. In this paper, the integrated business expansion process is integrated into the sunlight Business Expansion Platform by using automation technology and information technology to improve the operational efficiency of business expansion.

### 2.2 Collaborative optimization of business expansion service process based on sunlight Business Expansion Platform

In this paper, under the "one-stop" operation mode of sunlight Business Expansion Platform, the process of high-voltage business expansion is centralized into two departments, namely, the control center and the development department, in which the key customer management department is directly under the jurisdiction of the control center and the development department, the power distribution department, the service department, the power supply department and so on. Input the data into the platform, and input the relevant data into the platform to shorten the business data search time [11]. The specific high-voltage business expansion process is shown in Figure 2 below.

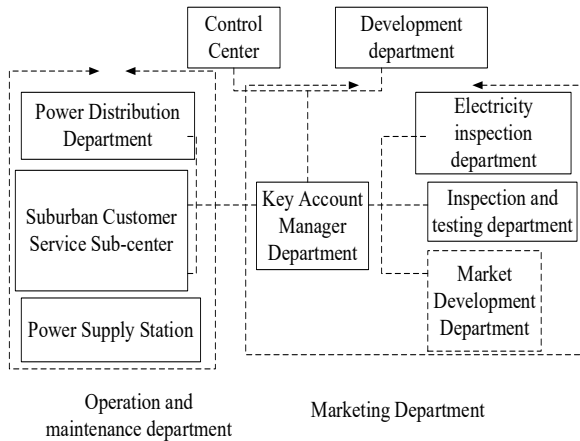


Fig. 2. High-voltage business expansion process

As shown in Figure 2, the relationship between the operation and maintenance department and the marketing department is relatively close. In this paper, the platform algorithm is used to calculate the correlation between the two departments. The formula is as follows:

$$x = K \sum_{i=1}^k \alpha x_{i-1} \tag{1}$$

$$w = (1 - \phi x_{i-1}) \tag{2}$$

$$\phi(x, w) = wxM \tag{3}$$

In the formula (1-3),  $x$  is the historical situation of the operation and maintenance department in the business expansion process;  $w$  is the historical situation of the marketing department in the business expansion process;  $K$  is the correlation interference coefficient;  $\alpha$  is the random collaboration sequence;  $x_{i-1}$  is the business expansion service time limit at the  $i-1$ th time;  $\phi$  is the delay operator;  $\phi(x, w)$  is the correlation coefficient of two departments;  $M$  is the partial correlation factor in the industry expansion process [12]. Through the calculation of correlation, the correlation data is removed to achieve the purpose of simplifying the business expansion process, thus achieving the goal of small investment and high income, and maximizing the economic benefits of power enterprises.

### 3 Case analysis

#### 3.1 Enterprise profile

In order to verify whether the business expansion process designed in this paper has practical value, this paper takes X power supply enterprise as an example to analyze the above process design. X Power Supply Enterprise has been established for about 20 years, and is responsible for the power supply of two urban districts and six counties. The power supply area is about  $1.52 \times 104 \text{ km}^2$ , the power supply population is more than 3.5 million, and the number of power supply households is 1.25 million. At present, there are more than 2000 long-term workers in enterprises and more than 1000 rural power workers. The enterprise has more than 900 10 kV trunk lines with a total length of 12452 km. In order to meet the demand of market competition, X power supply enterprise began to change the service concept of business expansion process.

After using the business expansion process designed in this paper, the business expansion processing time is shown in Table 1 below.

**Table 1.** Business expansion process processing time

Months	High-voltage industrial expansion power supply user	Low-voltage industrial expansion power supply user	Business expansion process processing duration/day
January	102	182	15
February	110	126	16
March	85	275	18

April	68	143	9
May	92	181	14
June	159	166	17

As shown in Table 1, after using the business expansion process designed in this paper, the processing time of the business expansion process is significantly reduced, which can meet the power supply needs of enterprises. On this basis, the time limit compliance rate of business expansion service is calculated, and the formula is as follows:

$$\chi = \frac{\sum_{i=1}^n (V/V_0)}{v_t} \times 100\% \tag{4}$$

In formula (4),  $\chi$  is the time limit compliance rate of business expansion service;  $V$  is the number of archived processes in the current month that do not exceed the time limit;  $V_0$  is the sum of the number of archived processes in the current month;  $V_t$  is the assessment deadline;  $n$  and  $i$  are constants. Through calculation, it is concluded that the time limit of business expansion service is up to the standard, as shown in Figure 3 below.

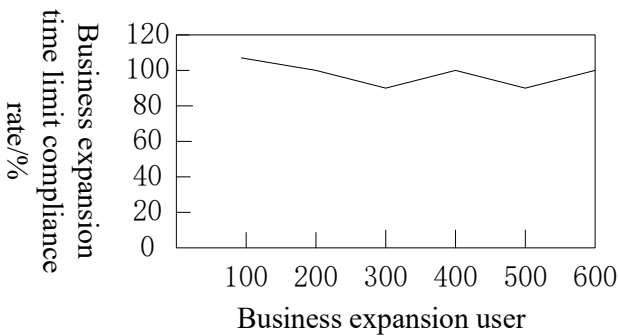


Fig. 3. Business expansion service time limit compliance chart

As shown in Figure 3, 600 business expansion users are randomly selected in this paper, and the business expansion time limit compliance rate always fluctuates within the range of 90% ~ 110%, which is relatively high and can meet the needs of business expansion [13].

### 3.2 Application results

Under the above conditions, this paper selects the power supply situation of X power supply enterprise in the first half of the year for analysis. The total number of power supply users of X power supply enterprise from January to June 2020 is 743, and the total power supply capacity is  $81.43 \times 104$  kVA. When other conditions are the same,

the method designed in this paper is applied to X power supply enterprise, and the application results are shown in Table 2 below [14].

**Table 2.** Application results

Months	Total amount of power supply users	Total capacity of power supply/kVA
January	282	$27.02 \times 10^4$
February	343	$30.06 \times 10^4$
March	195	$28.43 \times 10^4$
April	208	$29.12 \times 10^4$
May	252	$25.36 \times 10^4$
June	303	$31.08 \times 10^4$
Sum	1583	$171.07 \times 10^4$

As shown in Table 2, after using the business expansion process collaborative design method designed in this paper, the total number of power supply users is larger, which is more than twice the total number of power supply users of X power supply enterprise in the first half of last year. The total power supply capacity is also higher. According to the social average electricity price of 0.5802 yuan/kVA, it is roughly estimated that it can at least increase the potential economic income of X power supply enterprise by 992548.14 yuan. Therefore, after using the method designed in this paper, X power supply enterprise can increase economic benefits, conducive to the development of enterprises, which is in line with the purpose of this study.

## 4 Conclusion

The main work content of business expansion is to accept the power application of customers and to formulate and implement a reasonable power supply scheme according to the actual situation of the power system. Electricity customers need to sign power supply contracts with power units, and power units install electricity meters for users.

With the continuous progress of society, power supply units should not only improve the power supply capacity but also improve the service level. In recent years, the reform of the electric power system has entered a stable and orderly stage, and people's demand for electricity has changed from "using electricity" to "using electricity well". Therefore, this paper studies the collaborative design of power grid business expansion process based on the sunlight Business Expansion Platform, from two aspects of integrating business expansion process and optimizing business expansion service, to achieve the high efficiency of business expansion, and to provide protection for the development of power enterprises.

## References

1. Xie S, Hu Z, Yang L. (2020) Expansion Planning of Active Distribution System Considering Multiple Active Network Managements and the Optimal Load-Shedding Direction. *International Journal of Electrical Power & Energy Systems*, 115(Feb.):105451.
2. Munoz-Delgado G, Contreras J, Arroyo J M. (2021) Integrated Transmission and Distribution System Expansion Planning under Uncertainty. *IEEE Transactions on Smart Grid*, pp. 99.
3. Velloso A, Pozo D, Street A. (2020) Distributionally Robust Transmission Expansion Planning: a Multi-scale Uncertainty Approach. *IEEE Transactions on Power Systems*, 2020, pp. 99.
4. Resch M, Buhler J, Schachler B. (2021) Techno-economic Assessment of Flexibility Options Versus Grid Expansion in Distribution Grids. *IEEE Transactions on Power Systems*, pp. 99.
5. Cattani I B, Chaparro E, B Barán. (2020) Distribution System Operation and Expansion Planning using Network Reconfiguration. *IEEE Latin America Transactions*, 18(5):845-852.
6. Pourahmadi F, Kazempour J, Ordoudis C. (2020) Distributionally Robust Chance-Constrained Generation Expansion Planning. *IEEE Transactions on Power Systems*, 35(4):2888-2903.
7. Tyler E, Cohen B. (2021) A Complex Systems View of Climate and Development Issues in South African Coal Power Expansion. *Journal of Energy in Southern Africa*, 32(1):1-13.
8. Cardenas J, Celeita D, Ramos G A. (2020) Reverse Power Flow (RPF) Detection and Impact on Protection Coordination of Distribution Systems. *IEEE Transactions on Industry Applications*, 56(3):2393-2401.
9. Xu J, Wu Z, Yu X. (2020) A Dynamic Robust Restoration Framework for Unbalanced Power Distribution Networks. *IEEE Transactions on Industrial Informatics*, pp. 99.
10. Wang L, Zhou S. (2020) Fractional Dynamic Caching: A Collaborative Design of Storage and Backhaul. *IEEE Transactions on Vehicular Technology*, pp. 99.
11. Wang Jingying, Zhao Yan, Zhang Haoyu, Bai Yinming, Wang Xiaoling. (2021) Analysis on Business Process Optimization of Power Industry Expansion Based on Business Environment Optimization. *Automation application*, pp. 117-119.
12. Zhang Guoliang, Zhao Hong, Huang Huabin, Lu Jianchao, Zhang Yujia. (2021) Strengthen Business Expansion Management and Continuously Improve Customer Satisfaction. *Metallurgical Management*, pp. 191-192.
13. Jiang Dong, Liu Liang. (2020) Analysis on the Internet Unified Service of Business Expansion Based on the Optimization of Power Business Environment. *Electric drive automation*, 42(05):40-42+54.
14. Pan Mingming, Qin Jian, Zhao Hongying, Yu Yang, Wang Zhibin. (2020) Research on Verification Technology of Business Expansion Application Materials Based on Feature Intelligent Recognition. *Supply and use electricity*, 37(06):9-12+32.



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