Research on Pricing and Market Competitiveness of Electricity Retailers under New Strategy of Electric Power System Reformation

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Abstract. This paper studied the pricing and market competitiveness of different electricity retailers under New Strategy of Electric Power System Reformation (NSEPSR). Firstly, based on the analysis of the types and characteristics of the existing electricity retailers, the pricing model of all kinds of electricity retailers was constructed based on the Bertrand model. The equilibrium solution was the reasonable pricing of the retailer. Secondly, the user utility model was constructed by using the analytic hierarchy process (AHP), and the Logit model was used to simulate the probability of the selection of different electricity retailers. The market share of all kinds of electricity retailers in the open market environment was obtained. The feasibility of the proposed model was verified by practical examples. The conclusion could provide a theoretical reference for the market operation strategy of the electricity retailer under the reform of power system.

1. Preface

Since the 1990s, countries in the world have initiated an upsurge of electricity market reform. In March 2015, the “Several Opinions of the Central Committee of the Communist Party of China on Further Deepening the Reform of the Electric Power System”(Zhongfa [2015] No. 9) clearly put forward the “three open and one independent” electric power system reform route, in accordance with the control of the middle, To open up the two institutional frameworks, orderly release the price of electricity in competitive links other than transmission and distribution, orderly release the electricity distribution business to social capital, orderly release electricity and electricity generation plans other than public welfare and adjustment, and promote trading institutions. Relatively independent, standardized operation. Among them, the liberalization of the placing of electricity business will promote the formation of a number of independent electricity sales companies, breaking the traditional mode of China's grid companies have been formed, forming a "buy more to sell," the market structure, to the grid company to bring greater pressure on competition.

In the open market for electricity sales, the business of electricity sales companies includes the purchase and sale of electricity services and other value-added services. Among them, the purchase
and sale of electricity is the core business of the power sales company. The difference between the purchase of electricity by the sales company and the sale of electricity is its profit. Using competition in the power generation market to reduce the cost of purchasing electricity and using marketing strategies to attract more customers for electricity use is a fundamental way for the power sales company to enhance its core competitiveness. In addition, due to the indiscriminate nature of power, the power sales company will also provide value-added services to enhance its core competitiveness. Value-added services include contract energy management, meter reading maintenance services, and energy internet.

According to the different types of investment companies, power sales companies can be divided into three major categories: 1) power sales companies invested by power grid companies; 2) power sales companies invested by power generation companies; 3) power sales companies (including energy-saving services) with other social capital investments Enterprises, electrical equipment manufacturing companies, water supply and heating and other public service industries, large-scale electricity providers, etc.). Power grid companies have a large customer base and social credibility, and the company has great strength. Due to mastering the vast majority of power grid resources and leading power grid technology, it has a strong competitive advantage in the power sales market. However, the disadvantage is the lack of a flexible electricity pricing mechanism and the lack of diversity in service channels and service measures. Power companies sell power companies have power resources, the company has strong strength, and also has strong advantages in the market competition for power sales. However, the disadvantage is that power generation companies do not directly face customers, and they do not know much about customer needs. Sales companies with other social capital investments do not have an advantage in terms of power supply and customer resources, but they are able to design their businesses in accordance with an ideal market structure. They are more flexible and easy to adopt advanced technologies and management methods to provide high-quality auxiliary services.

Research on the market for electricity sales is relatively mature abroad. As the foreign power market reforms started earlier, the current development of the entire power market is relatively stable [1]. The foreign research on the power sales market mainly includes the bidding decision of the power selling entity, the purchase and sale of power decisions, and risk management [2]. In the auction decision of the main power seller, the literature [3-5] studies the decision of the users with distributed power to participate in the bidding of the power selling market; in the decision to purchase and sell power, the literature [6-7] studies the side of the power sale side In the environment, based on robust optimization, the decision-making method for the purchase and sale of electricity from the main body of electricity sales, and the management of electric risk in the purchase and sale of electricity, the literature [8-9] studies the electricity supply and sales risk management of electricity sales entities in the Australian electricity market.

At present, there is relatively little research on the release of the power-supply side. The literature [10] studies the marketing strategies of the power-supply companies that take into account the disruptive load; the literature [11] studies the analysis and prediction of the power-selling market under the unified purchasing and unbundling model. Established a set of index system to analyze the development trend and marketing effect of the power sales market; literature [12-13] studied the electricity sales strategy and risk management of power sales companies considering the price elasticity of user demand; literature [14] aimed at a new round After the reform of the electricity market, the development direction of the power sales business under the market competition environment has been explored. However, there is still a lack of research on the pricing and market share of power selling companies in the competitive market. Research on this issue can provide reference for the operation of power sales companies and is of great significance.

This article uses the Bertrand model in game theory combined with analytic hierarchy process to study the market competitiveness of different types of power selling companies. The first section introduces the pricing models of three kinds of power sales companies in the power market. The Bertrand model in game theory is used to analyze and model the sale price of the three main types of
power sales companies in the power sales market, and to solve them. The obtained Nash equilibrium solution is the reasonable sale of power by different types of power sales companies. Price. The second section introduces the market share analysis of different types of power sales companies in the power sales market. Based on the pricing of different power selling companies, AHP is used to model user utility, and Logit model is used to simulate the selection probability of power users for different power sales companies to obtain the market for different power sales companies under market environment. Share. Through analysis, the impact of different factors such as sales price of electricity and auxiliary services on the market share can be obtained, which will provide reference for the operation of the power sales company.

2. Sales Company Pricing Modeling

When the power selling company formulates its operation strategy, the first consideration is the issue of the pricing of electricity. In the power sales market, the process of setting price of electricity by different power sales companies is a game process. There is no cooperation between the power sales companies and they all seek to maximize their own interests. They compete by establishing different power selling prices. The Bertrand model in the theory is consistent.

The Bertrand model in game theory is an oligopolistic price competition model. It is assumed that there is no formal or informal cooperation among oligopolists, and competition is only achieved by selecting different product prices [15-16]. The solution is the reasonable pricing of different companies in the competitive market. In the open market for power sales, the power sales companies invested by power grid companies, power sales companies invested by power generation companies, and power sales companies of other social capital investments can be regarded as three oligopolistic companies. The competition between different power sales companies is non-cooperative. In order to compete by selecting different power selling prices, the Bertrand model can be used to model the pricing of the three oligopolistic companies. Numbers 1, 2, and 3 represent sales companies of power grid companies, power sales companies, and other social capital investment and sales companies. Accordingly, sales prices are $p_1, p_2, p_3$; consumers' demand for three companies for:

$$
\begin{align*}
q_1 &= a - b_1 p_1 + d_{12} p_2 + d_{13} p_3 \\
q_2 &= a - b_2 p_2 + d_{21} p_1 + d_{23} p_3 \\
q_3 &= a - b_3 p_3 + d_{31} p_1 + d_{32} p_2
\end{align*}
$$

In the formula: $a$ is the actual demand in the market; $q_1, q_2, q_3$ respectively represents the power sales of the three companies; $b_1, b_2, b_3$ represent the user's sensitivity to the price of different power sales companies, depends on the average consumption of the users for which the power sales company provides services. Level, the higher the level of consumption, the lower the sensitivity to the price; $d_{11}, d_{22}, d_{33}$ represents the substitution factor of this kind of power sales company to other types of power sales companies. For example, $d_{21}$ indicates the possibility of power company sales companies replacing power grid companies.

Assuming that the marginal costs of the three companies are constant $c_1, c_2, c_3$, the profit function of the three power sales companies is:

$$
\begin{align*}
\pi_1(p_1, p_2, p_3) &= (p_1 - c_1) \cdot q_1 \\
&= (p_1 - c_1) (a - b_1 p_1 + d_{12} p_2 + d_{13} p_3) \\
\pi_2(p_1, p_2, p_3) &= (p_2 - c_2) \cdot q_2 \\
&= (p_2 - c_2) (a - b_2 p_2 + d_{21} p_1 + d_{23} p_3) \\
\pi_3(p_1, p_2, p_3) &= (p_3 - c_3) \cdot q_3 \\
&= (p_3 - c_3) (a - b_3 p_3 + d_{31} p_1 + d_{32} p_2)
\end{align*}
$$

In the open environment of the power sales side, the competition of the power sales company is a non-cooperative game. Participants pursue the maximization of their own interests. Therefore, for the game between the three types of power sales companies, the Nash equilibrium \( (p_1^*, p_2^*, p_3^*) \) can be solved by the following the optimization problem is:

\[
\begin{align*}
\max_{p_1 \leq c_1} \pi_1(p_1, p_2, p_3) &= \max_{p_1 \leq c_1} (p_1 - c_1)(a - b_1 p_1 + d_1 p_2 + d_1 p_3) \\
\max_{p_2 \leq c_2} \pi_2(p_1, p_2, p_3) &= \max_{p_2 \leq c_2} (p_2 - c_2)(a - b_2 p_2 + d_2 p_1 + d_2 p_3) \\
\max_{p_3 \leq c_3} \pi_3(p_1, p_2, p_3) &= \max_{p_3 \leq c_3} (p_3 - c_3)(a - b_3 p_3 + d_3 p_1 + d_3 p_2)
\end{align*}
\]

(3)

Get the derivation of the profit function in (2):

\[
\begin{align*}
\frac{\partial \pi_1}{\partial p_1} &= \frac{\partial [(p_1 - c_1)(a - b_1 p_1 + d_1 p_2 + d_1 p_3)]}{\partial p_1} = 0 \\
\frac{\partial \pi_2}{\partial p_2} &= \frac{\partial [(p_2 - c_2)(a - b_2 p_2 + d_2 p_1 + d_2 p_3)]}{\partial p_2} = 0 \\
\frac{\partial \pi_3}{\partial p_3} &= \frac{\partial [(p_3 - c_3)(a - b_3 p_3 + d_3 p_1 + d_3 p_2)]}{\partial p_3} = 0
\end{align*}
\]

(4)

The Nash equilibrium solution is:

\[
\begin{align*}
p_1^* &= \frac{a + b_1 c_1 + d_1 p_2^* + d_1 p_3^*}{2b_1} \\
p_2^* &= \frac{a + b_2 c_2 + d_2 p_1^* + d_2 p_3^*}{2b_2} \\
p_3^* &= \frac{a + b_3 c_3 + d_3 p_1^* + d_3 p_2^*}{2b_3}
\end{align*}
\]

(5)

This is the equilibrium price of each power sales company when its profits are maximized.

3. Market share modeling of power sales companies

In the power sales market, different power sales companies provide different services, have different power sales prices, and have different market share. Analyzing the impact of different power sales prices and different service quality on its market share can provide reference for the power sales companies in formulating their operation strategies, thereby improving their market competitiveness. In the face of the multiple choices in the electricity sales market, whether a user chooses a power selling company depends on the company's attractiveness to the user. The attraction can be described by "user utility". In order to analyze the market share of different power sales companies in the power sales market, this paper first uses the analytic hierarchy process to model the utility of the power sales company, and then uses the Logit model to simulate the power user's choice probability for different...
power sales companies. Find the market share of different power sales companies in a market environment.

3.1. User Utility Modeling
By analyzing the key factors affecting the user's utility, a framework for user utility analysis is constructed, as shown in Figure 1.

![Figure 1. User utility hierarchy model](image)

Using the Analytic Hierarchy Process (AHP), we compare the factors at each level and construct a judgment matrix. Determine the weight of each indicator and check the consistency to determine the weight value of each indicator; normalize each indicator's value to get the expression of user utility:

$$ U = k_1 \cdot C_1 + k_2 \cdot C_2 + k_3 \cdot C_3 + k_4 \cdot C_4 $$  \hspace{1cm} (6)

When constructing a judgment matrix, users can be divided into three different types of preferences for the first level of the criteria layer: price preferences, brand preferences, prices, and brands are equally important. For the user with price preference, the B1 item in the hierarchy is more important than the B2 item; for the user with brand preference, the B2 item in the hierarchy is more important than the B1 item; for the user with the same price and brand preference, the B1 item in the hierarchy is Item B2 is equally important. In the second level of the criteria level, for users, the price of electricity is more important than the contract structure, that is, C1 is more important than C2; auxiliary services are more important than corporate image and reputation, that is, C4 is more important than C3.

For other social capital investment and sales companies, because the price of electricity sold and reputation are not dominant, they can only seize market share by optimizing the contract structure and providing diversified auxiliary services. Other social capital investment and sales companies can be further divided into energy-saving service enterprises, electric equipment manufacturing companies, water supply and heating and other public service industries, and large-scale electricity suppliers. Among them, energy-saving services companies can provide energy-saving services for users; electrical equipment manufacturing companies, water supply and heating and other public service industries can provide users with meter reading maintenance services; large-scale electricity providers can provide users with energy Internet services. Therefore, in the specific analysis of the market share of different types of power sales companies in other power companies that invest in social capital, C4 auxiliary services in the hierarchy of user utility can be further divided into: energy saving services, meter reading maintenance services, and energy Internet service, as shown in Figure 2.
AHP is used to model the hierarchy of ancillary services, and a judgment matrix is constructed to determine the weight of each index. For users, reducing electricity bills is the primary consideration. Therefore, in the three auxiliary services, energy-saving services are the most important, and meter reading maintenance services and energy Internet services are relatively less important. Let index weights of D1, D2, and D3 relative to C4 be \( k_{41}, k_{42}, k_{43} \), respectively. The user utility expression can be further written as:

\[
U = k_1 \cdot C1 + k_2 \cdot C2 + k_3 \cdot C3 + k_4 \cdot C4
\]

\[
= k_1 \cdot C1 + k_2 \cdot C2 + k_3 \cdot C3 + k_4 \cdot D1 + k_4 \cdot k_{41} \cdot D1 + k_4 \cdot k_{42} \cdot D2 + k_4 \cdot k_{43} \cdot D3
\]

(7)

3.2. User Probability Modeling

In the power sales market, the power sales company has the right to freely set the power sale price mechanism and provide other value-added services according to its purchase cost. The power users can choose their appropriate price category and value-added service type according to their own load characteristics and power consumption preferences, so different types of power pricing strategies and value-added services will lead to different market share. In order to characterize the market share of different power sales companies, this paper uses Logit model to simulate the power users' choice probability of different power sales companies. First of all, score the indicators that affect user utility in different types of power sales companies (in which the energy price is calculated from the Bertrand pricing model introduced in the previous section), and assign the score results to the user utility expressions to obtain different types of sales. The company's user utility, after substituting Logit model to calculate the market share of different types of power selling companies.

In the power sales market, users will compare the utility of the services provided by each power sales company to their own utility, and choose the utility contract that has the greatest utility. Factors that affect user utility include both observable (predictive) and unobservable (unpredictable) factors. Random terms are often used to simulate the effects of all unobservable random factors, so user utility can be expressed as:

\[
U_i = V_i + \varepsilon_i
\]

(8)

Among them, \( U_i \) indicates that the user selects the utility of the company i, \( V_i \) indicates the utility that the user can observe, and \( \varepsilon_i \) indicates the random item in the utility.

When the user selects the power selling company, if the utility of company i is greater than the utility of j, the user will choose company i that is:
According to the basic assumptions of the Logit model, the utility residuals satisfy the independent iso-distribution, also known as Gumbel distribution or extreme value distribution, and their probability density functions are:

$$f(\varepsilon_i) = \exp(-\varepsilon_i) \cdot \exp(-\exp(-\varepsilon_i))$$  \hspace{1cm} (10)

The distribution function is:

$$F(\varepsilon_i) = \exp(-\exp(-\varepsilon_i))$$  \hspace{1cm} (11)

If $\varepsilon_i$ is given, then equation (9) represents the cumulative probability distribution of $\varepsilon_j$ at $V_i - V_j + \varepsilon_j$: $\exp(-\exp(-(V_i - V_j + \varepsilon_j)))$. Since $\varepsilon$ is independent, for all $j$ ($j \neq i$), the probability is the product of all $\varepsilon$ cumulative probabilities: $P\{\varepsilon_i \mid \varepsilon_i = \prod_{j \neq i} \exp(-\exp(-(V_i - V_j + \varepsilon_j)))$.

However, since the random variable is not given, it can be known from the knowledge of probability theory:

$$P_i = P\{\varepsilon_i \mid \varepsilon_i \} \cdot P(\varepsilon_i)$$  
$$\quad = \int_{-\infty}^{\infty} \prod_{j \neq i} \exp(-\exp(-(V_i - V_j + \varepsilon_j))) \cdot \exp(-\varepsilon_i) \cdot \exp(-\exp(-\varepsilon_i)) \cdot d\varepsilon_i$$  
$$\quad = \int_{-\infty}^{\infty} \prod_{j \neq i} \exp(-\exp(-(V_i - V_j + \varepsilon_j))) \cdot \exp(-\varepsilon_i) \cdot d\varepsilon_i$$  \hspace{1cm} (12)

Let $\alpha = \exp(-\varepsilon_i)$, then:
From the above equation, the probability \( P_i \) that the user selects a power selling company depends on the utility of the company and its competitors. For each type of electricity sales company in different types of companies to affect the user's utility of the score points, and score results into (7) to get the utility value of different types of electricity sales companies. By substituting the utility value of different power sales companies into formula (13), the probability that the user selects different power selling companies can be obtained, thereby obtaining the market share of different power selling companies.

4. Analysis of examples

4.1. Pricing Strategy

The Bertrand model was used to determine the pricing models of the three types of power sales companies—the power grid companies that sell power, the power companies that sell power, and other social capital investment and sales companies. The basic parameters in the model are shown in Table 1.

| retailer                      | Price sensitivity coefficient (bi) | Marginal cost (ci) | Alternative factor (dij) |
|-------------------------------|----------------------------------|--------------------|--------------------------|
| 1 Power grid retailer         | 0.9                              | 0.12               | j=2 0.4                  |
| 2 Generator retailer          | 1.0                              | 0.10               | j=3 0.3                  |
| 3 Other social capital        | 0.8                              | 0.14               | investment retailer      |

Let the market demand coefficient in the Bertrand model \( a = 0.5 \), and the values of each parameter are substituted into formula (5) for solving. The power company sales company \((p_1^*)\), power generation company \((p_2^*)\) and other social capitals are solved. The equilibrium price of an investment and sales company \((p_3^*)\) is:

\[
\begin{aligned}
  p_1^* &= 0.5472 \\
  p_2^* &= 0.4480 \\
  p_3^* &= 0.6593
\end{aligned}
\]
According to historical data, the average on-grid tariff of the nationwide power generation enterprises in 2015 was 0.388 yuan/(kWh), and the average sales price was 0.643 yuan/(kWh) [17]. It can be seen that the pricing of electricity sold by different types of power sales companies calculated through the Bertrand model is reasonable.

4.2. Market Share Analysis

Assume that there are three types of power sales companies in the same power supply area at the same time: power companies selling power companies, power generating companies selling power, and other social capital investment and sales companies. Regardless of guaranteed power supply services, only the users participating in the power sales market are studied, and the market share of these three types of power sales companies is analyzed. On this basis, other social capital investment and sales companies will be further divided into energy-saving service enterprises, electrical equipment manufacturing companies, water supply and heating and other public service industries, and large-scale e-commerce, and the auxiliary services in the hierarchy of user utility will be used. Further subdividing the items, the market share of different types of social capital investment and sales companies.

(1) Analysis of market share of three types of power sales companies

When the user selects different power selling companies, he considers that the user has three types of preferences: price preference, brand preference, price, and brand are equally important. For each of these three different preference types of users, the user utility modeling is performed through the analytic hierarchy process, and a judgment matrix is constructed to determine the weight of each indicator. The results are shown in Table 2.

Table 2. Different preference type user utility index weight table

| Index Weight                  | $k_1$ | $k_2$ | $k_3$ | $k_4$ |
|-------------------------------|-------|-------|-------|-------|
| Price preference              | 0.5625| 0.1875| 0.0625| 0.1875|
| Brand preference              | 0.1875| 0.0625| 0.1875| 0.5625|
| Both are equally important    | 0.375 | 0.125 | 0.125 | 0.375 |

The results of the evaluation of the three types of companies are shown in Table 3. Among them, the average sales price is derived from the calculation results in the previous section, and it needs to be normalized to map the data to dimensionless values in the range of 0 to 10. With reference to the historical fluctuation of wholesale electricity prices, the normalized formula is defined as: $C_1 = -20p + 15$.

Table 3. Index score results of different electricity retailers

| Evaluation object             | Average sales price (yuan/kWh) | $C_1$ | $C_2$ | $C_3$ | $C_4$ |
|-------------------------------|-------------------------------|-------|-------|-------|-------|
| Power grid retailer           | 0.5472                        | 4.056 | 5     | 7     | 5     |
| Generator retailer            | 0.4480                        | 6.040 | 3     | 5     | 3     |
| Other social capital investment retailer | 0.6593                        | 1.814 | 7     | 3     | 7     |

Using the Logit utility function expression to solve the corresponding probability $P_j = \frac{\exp(u_j)}{\sum_{j=1}^{4} \exp(u_j)}$, the market share of the three types of power sales companies under different user preferences is shown in Table 4.
Table 4. Market share of different electricity retailers under different preference type

| User preferences                  | Price preference | Brand preference | Both are equally important |
|----------------------------------|------------------|------------------|-----------------------------|
| Power grid retailer              | 34.88%           | 42.73%           | 48.87%                      |
| Generator retailer               | 52.64%           | 8.02%            | 22.63%                      |
| Other social capital investment retailer | 12.47%           | 49.25%           | 28.50%                      |

(2) Analysis of market share of other social capital investment and sales companies

Other social capital investment and sales companies are further divided into energy service enterprises, electrical equipment manufacturing companies, water supply and heating and other public service industries, and large-scale e-commerce, and further subdividing the ancillary services in the hierarchy of user utility. The score results of each indicator for each power sales company are shown in Table 5.

Table 5. Index score table of different social capital investment electricity retailers

| Evaluation object                          | Average sales price (yuan/kWh) | C1 | C2 | C3 | D1 | D2 | D3 |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|
| Energy-saving service enterprises          | 0.6593                        | 3.4| 7  | 7  | 3  | 3  | 3  |
| Electrical equipment manufacturers         | 0.6593                        | 3.4| 7  | 3  | 5  | 5  | 3  |
| Water supply and other public service industries | 0.6593                        | 3.4| 7  | 3  | 3  | 7  | 3  |
| Large-scale electricity supplier           | 0.6593                        | 3.4| 7  | 3  | 3  | 3  | 7  |

Using Logit utility function expressions to solve the corresponding probabilities, the market share of different social capital investment and sales companies with different user preferences for all other social capital investment and sales companies is shown in Table 6.

Table 6. Market share of different electricity retailers under different preference type

| User preferences                          | Price preference | Brand preference | Both are equally important |
|-------------------------------------------|------------------|------------------|-----------------------------|
| Energy-saving service enterprises          | 31.78%           | 47.91%           | 39.52%                      |
| Electrical equipment manufacturers         | 25.82%           | 24.44%           | 25.66%                      |
| Water supply and other public service industries | 21.20%           | 13.82%           | 17.41%                      |
| Large-scale electricity supplier           | 21.20%           | 13.82%           | 17.41%                      |

Corresponding to different situations, the market shares of different power sales companies are plotted in Figure 3, Figure 4, and Figure 5, respectively.
Figure 3. Market share diagram of different electricity retailers under price preferences

Figure 4. Market share diagram of different electricity retailers under brand preferences
Through the above analysis, we can see: (1) For the price-preferred users, the market share of the three major types of power sales companies is basically evenly divided. Although the average power sales price of power generation companies is low, the power price mechanism is not flexible and will not provide attractive power purchase contracts. The average sales price of other social capital investment and sales companies is higher by providing more competitive power. The power purchasing contract can also capture a portion of the market share; the power grid companies selling power companies will seize part of the market share due to more balanced indicators. (2) For users with brand preference, users tend to select word-of-mouth and better-selling power companies. The power generation company's power sales companies do not understand the users, have poor services, and have a low market share; other social capital investment and power sales companies generally have better service and more market share; power grid companies have good corporate image and reputation. Will also seize part of the market share. (3) For users with the same price and brand preference, the market share of power grid companies and other social capital investment and sales companies is large. This is due to the fact that power grid companies have more advantages in terms of brand, service, and price for power sales companies, while other social capital investment and power sales companies have advantages in terms of service and contract structure. Compared with the two, the power company's power sales companies only have a slight advantage in the price of electricity while others do not have an advantage. Therefore, the market share is low.

In summary, it can be seen that under the circumstances of the sale of electricity on the side of liberalization, providing quality services and competitive electricity price contracts is an effective means to increase the competitiveness of electricity sales companies. In the market competition for power sales, power sales companies should not blindly reduce the sales price, but should focus on providing other value-added services and designing more attractive sales contracts. Only in this way can a higher market share be obtained in the competition.

5. Conclusion
This article studies the operation strategies of different power sales companies in the power sales market, and specifically analyzes the pricing and market share of different power sales companies in
the power sales market. First, it classifies a large number of power sales companies existing in the power sales market, and analyzes the characteristics of different types of power sales companies. Afterwards, using the Bertrand model in game theory to analyze and model the sales price of different types of power sales companies and solve them, the obtained Nash equilibrium solution is the reasonable pricing of different power sales companies in the power market. Based on the pricing of different power selling companies, AHP is used to model user utility, and Logit model is used to simulate the selection probability of power users for different power sales companies, and the market for different power sales companies is obtained. Share. This article divides the user's preferences into three categories: price preference, brand preference, and the same importance of the two. It calculates the weight of user utility and obtains the market share of different sales companies in different situations. The research results of this paper can provide reference for the sales company to formulate its operation strategy.

The pricing model proposed in this paper only considers three types of power sales companies for gaming. Subsequent research can consider the pricing game of more types of power sales companies, provide reference for more types of power sales companies to develop power selling prices, and increase sales companies’ market competitiveness.

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