Study on Operation and Investment Management of Power Grid Corp

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Abstract. In recent years, due to the impact of the macro economic downturn and the growth rate of sales of electricity, the company was very difficult to operate. In addition, demand for grid investment was very large, the company and development of power grids were facing huge challenges. In order to promote the healthy development of the company, it was urgent to study the key problems of the company’s operation and investment, and put forward the solutions. In order to promote the transformation of the company’s management and investment, it needs to enhance the company’s operating efficiency, to optimize the investment structure of the power grid, and to realize the sustainable development of the enterprise. In this article, history of management and investment was analyzed, the mutual influence of the company’s operation and investment was studied, dynamic equilibrium strategy of the operation of the company and the segment of double dimension - investment was proposed, and objective in line with the operation of the company and the scheme of coordinated development of power grid was scientific optimized.

Introduction

At present, China’s macro economy is descending, the situation of provincial electricity market continued to slow growth is difficult to fundamentally reverse during the 13th Five-Year, incremental benefit contribution to the overall effectiveness of the company will continue to decrease. However, the upgrading of rural power distribution network, meet the hydropower output and other aspects of the investment still need large money. It is urgent to study the impact of the company’s business and investment in the core issues, and put forward solutions. Because the operating system of foreign power grid enterprises is very different from China, the reference value of its business model is not great, and domestic research on this problem is little.

Operation and Investment of Company

From 2010 to 2011, for stimulating domestic demand and reconstruction electricity market grows very fast. From 2012 to 2015, due to the national macroeconomic and industrial restructuring in the province, electricity market growth rate dropped significantly, especially the growth rate is from positive to negative in 2015, as shown in Figure 1.

According to the current economic situation, due to the lack of market demand, the economic benefits of the enterprise decline, industrial investment continued to decline and other unfavorable factors, the development of the province’s economic downward, large industrial companies need to complete the digestion of excess capacity and the adjustment of industrial structure in a certain period. Therefore, the electricity market downturn is difficult to reverse the short-term growth. Only residents and commercial electricity maintain a high rate of growth, the sale of electricity market stabilizer role more obvious. During the 13th Five-Year, the situation of provincial electricity market continued to slow growth is difficult to fundamentally reverse, and the incremental benefit contribution to the overall effectiveness of the company will continue to decrease.
External power supply maintains at a stable level, nearly a few more than 20 billion kWh per year, as shown in Figure 2. The company’s power grid achieved leapfrog development, and delivery capacity reaches 28 million 500 thousand kilowatts, power supply mainly transport to Shanghai, Jiangsu, Zhejiang and other coastal developed provinces. Delivery of electricity is clean hydropower, and it made an outstanding contribution to the national energy-saving emission reduction and governance haze weather.

During the 12th Five-Year, investment of company is more than 140 billion yuan. In recent years, development of hydropower and new energy is accelerating, so the power grid supporting rigid demand remains high. From 2013 onwards, Sichuan hydropower generating units are going into the intensive period, but the Sichuan power grid transmission channel is still inadequate. Abandoned water problem is outstanding, and it needs to increase investment in the construction of water and electricity transmission channel. Power grid investment continues to maintain a relatively high level, it intensify the contradiction of enterprises owned capital shortage. External financing scale continues to increase. At last, the rate of assets and liabilities will go to a higher level, and the pressure of power grid construction funds increase. The total asset is rising, but the investment benefit is low, the profit margin is bad, and the debt ratio is rising.

**Relationship Between Business and Investment**

Business activities of enterprises will affect the company’s operating performance, and reflects the investment ability through the main indicators of financial investment. Enterprise ability will affect the investment behavior, investment behavior and the specific management activities of enterprises influence.

Power grid enterprise investment capacity calculation model [1,2] is,

\[ I_t = \alpha S (1 + \gamma)^t / \beta \quad (0<\alpha<1) \]  

(1)
In the formula, \( I_t \) is the investment capacity of year \( t \) of power grid enterprises, power grid enterprise operation for \( \alpha \) coefficient, \( S \) is the initial years of business income, \( \gamma \) for return on investment, \( \beta \) is ration of own funds accounted to total investment, investment period for \( t \).

Investment behavior affects the company’s operating performance, as shown in Fig.3. Various business activities require the basic development of investment as a guarantee, but excessive investment will have a negative effect on the company’s operations. The study found that in certain operating conditions, the operation of company (asset liability ratio) and investment is positively related. Characteristics of the high investment demand schedule will cause the high level of corporate debt, and it has a greater impact on the operation of the company. Investment structure and investment direction will also have an important impact on the company’s operations. Inefficient and ineffective investment not only will not have a positive impact on the company, but also will bring a burden on the company. Therefore, the reasonable arrangement of investment scale, optimize the structure of investment are very important to improve the operating performance of the company.

![Diagram of Management State, Investment Strategy, Investment Ability](image)

**Figure 3.** Relationship between company operation and investment.

Company management is the foundation and premise of investment. Business level determines the company’s investment capacity, and investment not affected by the impact of investment capacity will bring a negative impact on the company.

![Diagram showing relationship between Asset-liability ratio, Investment, and Management](image)

**Figure 4.** Analysis of relationship between company operation and investment.

Under certain conditions (the same business indicators, constraints), if business investment capacity is improved, the corresponding investment ability will enhance (from A to B), whereas investment capacity will be weakened (from A to C), as shown in Fig. 4. Therefore, an effort to improve the operating conditions of the company is the key to promote company’s investment capacity.
Dual Dimension-Piecewise Dynamic Equilibrium Model

Subsection strategy optimization model is as shown in Fig.5. Ensurance area means, investment amount is less than basic point section for the company. The investment demand is to ensure the minimum requirements section of the safe operation of the power grid or the basic development, to protect the area corresponding to the upper limit of the company’s assets and liabilities (basic point of debt). If the investment is less than basic point, the company’s basic operation requirements can’t be guaranteed, and it will affect the company’s business activities carried out.

Control area means, setting the company’s asset liability ratio control (debt control point), and measuring by the corresponding company investment arrangements (investment control points), so the zone of outside the control point is control area. If the investment arrangement is greater than the control point, the company’s operating indicators will exceed the expected control. In order to effectively control the investment arrangements, asset-liability ratio, it needs to set up early warning point of investment and debt.

Balance area means, investment arrangements between the basic point and control point, and the company’s asset-liability ratio is corresponding between control point and basic point. Therefore, the company investment arrangement can not only ensure the main demand of power grid development, but also can ensure the controllability of business indicators. At a certain extent, it coordinates the relationship of investment and operation, achieves the balance of the two.

Current grid development is analyzed, and reasonable annual investment demand is assessed to protect the basic needs of the arrangement. Operation situation of the company is carefully judged, control point and warning point of asset-liability ratio are set, and scientifically calculates investment arrangement control point and early warning point. In principle, investment is between the control point and the warning point.

Figure 5. Subsection strategy optimization model.

Figure 6. Effect of company management on investment.
The company can increase the ability of investment arrangement by improving the operation conditions, as shown in Fig. 6. If the operating conditions of company to superior, on the one hand, the rate of asset-liability ratio of investment warning point and control point will be corresponding right. On the other hand, asset-liability ratio will be corresponding below under determining basic investment. Therefore, effort to improve the operating conditions of company is essential to enhance the company’s investment capacity.

Because the company’s business and investment is a dynamic behavior, and it is influenced by external policy guidance and economic environment, therefore, the specific amount of investment needs to be adjusted according to changes with company’s operating conditions.

Based on the segmentation strategy optimization model, according to basic point, warning point and control point of next three years, different company operation index results could be calculated. It needs to try to find the best investment balance point, and reasonably determine the company’s operation and investment objectives.

Conclusion

History of management and investment was analyzed, the mutual influence of the company’s operation and investment was studied, dynamic equilibrium strategy of the operation of the company and the segment of double dimension - investment was proposed, and objective in line with the operation of the company and the scheme of coordinated development of power grid is scientific optimized. At last, sustainable development of company was realized.

References
