

# Research on Risk Management and Power Supplying Enterprise Control

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**Abstract.** This paper derived from the background that electric power enterprises strengthen their risk management under requirements of the government. For the power industry, we explained the risk management theory, analysed current macro environment as well as basic situation, then classified and interpreted the main risks. In a case study on a power bureau, we established a risk management system based on deep understanding about the characteristics of its organization system and risk management function. Then, we focused on risks in operation as well as incorrupt government construction to give a more effective framework of the risk management system. Finally, we came up with the problems and specific countermeasures in risk management, which provided a reference for other electric power enterprises.

## 1. Introduction

The power industry is an important industry which is related with people's livelihood. Under the requirement on deepening the reform of electric power system and promoting constructing the electric power market, electric power companies should carry out comprehensive risk management and internal control work actively. State-owned business model of Chinese power industries has persisted for a long time, rendering the power industry in a monopoly position among domestic industries. Simple managerial patterns and methods have long existed power enterprises. Managerial methods and systems are often defective.

## 2. Risk management system theory

The process of enterprise risk management system is composed of three parts, risk identification, risk assessment and risk control as well as early risk warning system. The main task of the risk identification stage is collecting the basic operation information composed of multiple business units. This stage identifies the risk factors affecting business and management objectives through process identifying and case analysing, eventually forming the risk list. As the second stage, risk assessment uses probability theory and mathematical statistics methods, measuring and ranking identified risks based on risk probabilities and the degree of losing. According to the risk list, this stage quantitatively assesses the degree of loss and the level of risk, hence it's also called "secondary identification stage"<sup>[1]</sup>. The third stage, risk control, takes effective measures to avoid, reduce, accept and transfer the risks that have significant impact on the important risks that have been identified and evaluated effectively in the two stages illustrated above. This stage is based on the enterprise's risk preference, tolerance and developing perspective. The risk monitoring and early warning system are mainly constructed of three parts: the information monitoring risk system, the early warning model risk system and the rapid responding system. Through analysing the historical data of risk state, monitoring the real-time data



and predicting the future state, this stage evaluates and gives out classified early warning signals, then triggers the corresponding class of replying mechanism<sup>[2]</sup>.

### 3. Power industry's basic situation

#### 3.1. The whole society's sub-sectors' electricity structure

During the six years from 2010 to 2015, the urban and rural residents' electricity consumption maintained relative stability. The second industry had the highest proportion in three major industries, followed by the service industry and the first industry. The proportion of the primary industry and the secondary industry decreased with fluctuation year by year and the heavy industry dropped more than the light industry, but still came out on top. The service industry's electricity proportion had increased a lot.

#### 3.2. The power industry's reformation

Table 1. Main power policies issued in recent two years

Date	Leading Department	Documents and Meetings	Major Measures
2015.2.1	The State Council	Central File No.1	To upgrade the rural power grid, apply grid extension, photovoltaic, wind power and small hydropower. To supply people without access to electricity by 2015.
2015.7.6	National Developing and Reforming Commission, The National Energy Board	Guidance on Promoting Intelligent Grid's Developing	To building an elemental intelligent grid system by 2020 <sup>[3]</sup> .
2016.2.5	The State Council	Views on the Coal Industry Resolving the Excessive Capacity to Achieve Developing Getting Rid of the Poverty	To achieve the goal that the coal industry's capacity withdraws 500 million tons, to reduce and to recombine 500 million tons in 3 to 5 years. To stop approving new coal mine and technological transformation projects in 3 years.
2016.5.27	National Developing and Reforming Commission, The National Energy Board	Notice on Manage on the Wind Power, and Photovoltaic Generation Full-amount Indemnificatory Purchase	Approving the "Three North" provinces' minimum purchased guaranteed annual interest using hours from 1800 to 2000.
2016.10.8	National Developing and Reforming Commission, The National Energy Board	Releasing the Power Network Distribution Manage Approach Orderly	In a proper order, liberalize the distribution operation of the grid below 110 thousand volts and the grid below 220 thousand volts voltage in industrial commercial areas.

#### 3.3. Major risks on the power industry

**3.3.1. Financial risk.** The financial risk of electric power enterprises mainly lays in the budget, the fund manage, the cost control and the finance report.

**3.3.2. Marketing risk.** The power industry's marketing risk mainly manifesting in two aspects because of the energy products' particularity. On electricity's recovery, performing the risks that electricity's recovery is untimely or cannot be recovered. On customers' relationship, performing the risks that being complained by customers due to the service problem [4].

**3.3.3. Safety and production risk.** By going through elements in safety and operation risk control regime, the risks on safety, health and environment are comprehensively controlled. At the same time, the quality manage correlative standards are integrated according to the actual situation so that the system runs well.

**3.3.4. Human resource risk.** The risks in the electric power enterprises' process of human resource manage mainly including the following aspects: human resource exploration risk, risk on weak salary incensing system that lacks performance manage and risk on untimed personal administrating system.

**3.3.5. Inccorrupt government risk.** Inccorrupt government risk is a non-systematic risk, using morality, institution and law to build three barriers. Consequently, ideology education is strengthened and various systems as well as processes are completed, intensifying the legal warning publicity.

#### 4. Power bureau's manage system of risk manage organization

##### 4.1. Risk manage and organization model

The power bureau has changed the risk management from diversification and classification to strategic and systematic and designed the risk manage organization model. Constantly, the decision-making authority, management institutions, executive agencies and supervisory have also been clarified in their responsibilities and work procedures.

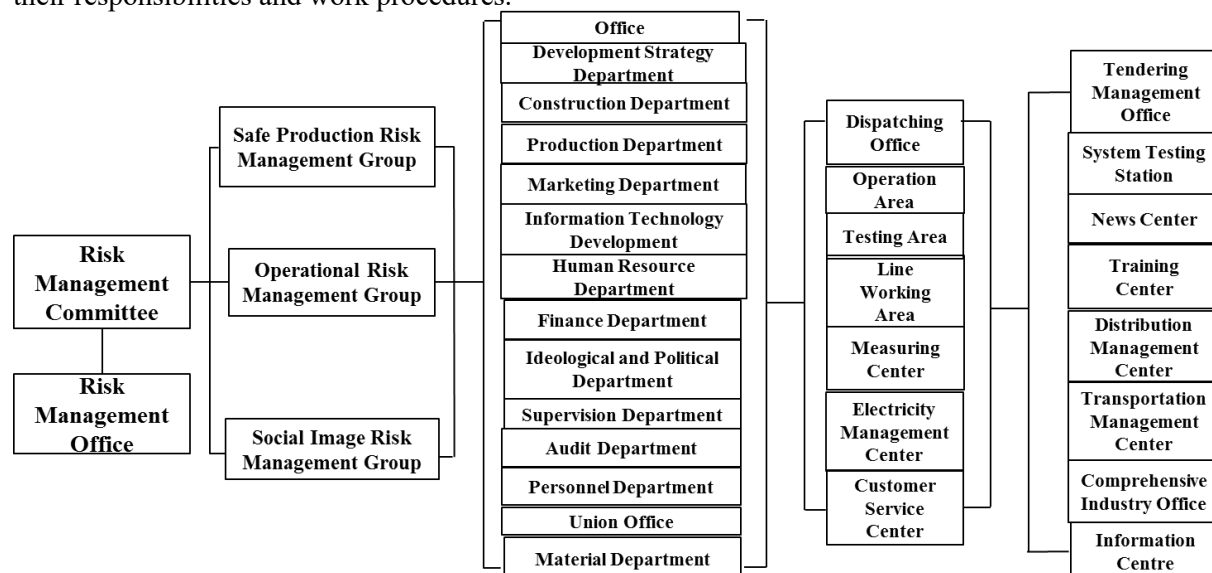


Figure 1. Power bureau's risk management organization model

##### 4.2. Operational risk system construction

Risk management on overall marketing business is on top priority. The purpose of marketing risk management is to analyse the risks that exist in the marketing business and to control them by their

importance, avoiding to the largest extent the economic and non-economic losses caused by uncertainty.

*4.2.1. Risk identification.* Operational risk analysis starts with sorting the business process, communicates with personnels and forms the business process catalog after communicating. Risks existing in the business are identified through the work structure method (WBS), while risks lying in posts are identified from the job's responsibilities and activities. The initial risk events identified by WBS method need to be further screened with other five methods, including the interviewing survey, questionnaires, state grid marketing system and standards, the state grid risk prevention manual and the database of the power industry. Risk analyzing table is confirmed through the five methods. The impact of each risk point is analyzed through discussion, formatting the operational risk analyzing manual.

*4.2.2. Risk measurement.* The mathematical and statistical models are used to quantify the possibilities and influence of risks, to classify the risk level and degree and to lay the foundation on determining risk and analyzing risk strategy. Then, risk events and consequences measurements are conducted for operational risks, identifying three-level risk events and significant risks. First, the influence of the risk and the class of the risk issues' occurrence possibility is determined. The influence of the risk has six kinds, each is divided to 1 to 5 levels and also, the risk issues' occurrence probability has 1 to 5 levels.

Table 2. The risk influence and the possibility class

	Electricity Retrieving	Financial Loss (RMB)	Enterprise Business Reputation	Casualties	First-rate Service	the Safety of the Power Supply and Consumption	Possibility
Class 1	Electricity Bill Dispute	Less than 100 thousand	Within the jurisdiction of the branch	Minor Injuries	Complain on 95598	Individual user outage	Similar risks have never occurred in counterparts
Class 2	Payment Delay	From 100 thousand to 1 million	In Shaoxing	Less than 3 deaths or less than 10 injured	County Media Disclosure	Small blackout	Similar risks have occurred in counterparts
Class 3	Payment Default	From 1 million to 5 million	In Zhejiang	From 3 to 10 deaths	Municipal Media Disclosure	Significant customer outage	Similar risks have occurred in our company
Class 4	Doubtful Debts on Electricity Bill	From 5 million to 50 million	Nationwide	From 10 to 30 deaths	Provincial Media Disclosure	Large area blackout	Similar risks have occurred several times in our company
Class 5	Bad Debts on Electricity Bill	More than 50 million	Worldwide	From 30 to 100 deaths	National Media Disclosure	Citywide blackout	Similar risks often occurred in our company

By multiplying the degree of the risk's influence by the possibility of the risk occurrence, the score and class of the risk event is acquired.

Table 3. Standards for the risk event class

	Score	Character
Level 3	1-4	The possibility of the occurrence is small or consequences are not serious
Level 2	5-9	Have the possibility of occurrence or have some influential consequences after occurring
Level 1	10-25	A large possibility of occurrence or a serious consequence

*4.2.3. Risk control.* Risk control means to control the risks measured from marketing risks to avoid losses. For the risks in the electricity marketing business, the focus is control of two major risks: one is the special control on significant risks; another is the control as well as risk management on level 1 and level 2 risk events in non-significant risks covered by relevant business units <sup>[5]</sup>.

## 5. Questions and suggestions

### 5.1. Problems

The existing risk management organization system of a power bureau mainly has the following four problems, embodying in the absence of specialized risk management function of the whole power bureau, which also exists in other electric power enterprises.

Although a unified risk responding strategy has been made, there still lacks institutions determining the overall risk preference and tolerance degree from a global height, and also, systematic assessing, monitoring and early warning functions for risks. It's supposed to ensure the power bureau to judge significant risks in time and make effective responding measures when major changes occur in internal and external environment. The systematic management is also not enough. The power bureau's sectors may exert a good synergistic management effect on some areas' risk management, but lacks the functions of making the overall risk countering programs and strategies. Moreover, there's less risk management culture. On the one hand, the risk management work must be implemented on the ground. On the other hand, risk management needs to be managed from the system height. It also requires good collaborations of all correlated bureaus.

### 5.2. Suggestions

*5.2.1. Establishing specialized management agencies from global height.* The key to strengthening the risk management is to set up a special functional organization. From the point of view on strengthening the risk management function, the risk management committee and the special risk management organization should be set up to be responsible for the daily work of the company's risk management. For the risk management executive department, it is recommended to set up an independent full-time risk management department to play a better role from the global level.

*5.2.2. Strengthening the risk assessing, monitoring and early warning functions.* The risk early warning model system needs to achieve the calculation of the three-stage early warning indicators, the analysis of the risk of historical statistical data, risk assessments and warning signal dispatches. Setup of the three-level index system and weights is based on calculating risk information of all the indicators reported by monitor points. Then, statistical analysis is conducted on historical data of the targeted value and compared with warning conditions. Finally, an early warning signal is announced.

*5.2.3. Strengthening the construction of risk management information.* Risk management information system is expected not only to measure a variety of risks, but also to implement quantitative analysis and tests. Supervisory condition of risk matrix as well as ranking frequency spectrum and significant

risk as well as critical business processes should be monitored in the system instantaneously. The information system should alarm the significant risk information exceeding the upper limit of the risk warning and realize the integration and sharing of information.

*5.2.4. Strengthening the construction of risk management culture.* First, all the staffs' risk management philosophy should be established. Integration of the risk management concept, the integration concept of risk and management and the harmony concept of internal and external should be considering. Specific measures includes four aspects: strengthening the education and training of the risk management culture, strengthening enhancement of the risk management culture, formatting the risk management culture and establishing main points of the corporate risk management culture.

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