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Business Entrustment Risk Management and Control Model of Mixed Ownership Distribution Electricity Company

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***Abstract*—Mixed ownership distribution electricity company develops business entrusted operation, can reduce business costs and improve business efficiency. Firstly, the entrusted business of mixed ownership distribution electricity company is studied. Secondly, based on risk matrix method, risk classification model of mixed ownership distribution electricity company's business entrusted operation is constructed, introducing risk mean to optimize risk level into four levels. Finally, taking the maintenance and repair business as an example, a case study was carried out. The research results show that the model has good scientific and practical application value.**

Keywords—mixed ownership distribution electricity company; business entrustment; risk management and control model

I. INTRODUCTION

Incremental distribution investment business liberalization, as the focus and difficulty of the new round of power system reform, has been paid much attention by all sectors of society[1]. The State Development and Reform Commission and the State Energy Administration have approved three batches of pilot projects totaling 320 projects, by the end of July 2018, 73 owner projects have been identified and 37 projects' company set up have been completed, mixed ownership distribution electricity company will enter the operation stage on a large scale. Mixed ownership distribution electricity companies as a new market entity in the new round of power system reform, affected by the pressure of initial operation and other factors, commissioned operation has become an important choice for mixed ownership distribution electricity companies. There is an urgent need to carry out forward-looking research, build a risk management and control system of business entrusted operation, and promote the development of high-quality business.

This paper systematically studies the entrusted business scope of mixed ownership distribution electricity company, constructs a risk evaluation model of the entrusted business of mixed ownership distribution electricity company based on risk matrix method, and carries out empirical analysis with maintenance and repair business as an example based on the model.

II. ENTRUSTED BUSINESS OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

On the whole, the distribution company's distribution business and competitive business can be carried out on their own, or they can entrust operations. Based on the decision-making theory of classical business development methods, the main starting point for enterprises to choose entrusted operation is to integrate and utilize the more advantageous specialized resources from outside than enterprises themselves, thereby reducing business costs, improving business efficiency, leveraging its core competencies and enhancing environmental resilience[2].

Systematically combing the business of mixed ownership distribution electricity company, business expansion, material bidding, construction and transformation of distribution network, maintenance, emergency repair service, information construction, market-oriented business (electricity retail market, integrated energy services, etc.), enterprise integrated management services (training, logistics, security, etc.) can be listed as business.

III. BUSINESS ENTRUSTMENT RISK ASSESSMENT MODEL OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY BASED ON RISK MATRIX METHOD

A. Risk Classification Model of Mixed Ownership Distribution Electricity Company's Business Entrusted Operation

Risk matrix method is a structured method to identify the importance of risk in the process of commissioned business. According to the probability and impact degree of the risk, the size and priority of outsourcing risk can be determined, and the potential impact of risk can also be evaluated[3].

The risk influence degree of commissioned operation of mixed ownership distribution electricity company a_i is divided into five levels: "Critical, Serious, General, Minor, Negligible", and the probability of risk occurrence b_j is divided into five intervals "0-10%、11%-30%、31%-60%、61%-90%、91%-100%", which is as shown as in Table 1 and Table 2. Although there is subjectivity in evaluating and quantifying the risks and probabilities of entrusted operation, the risk assessment is more detailed and arbitrary by grade subdivision.

TABLE I. RISK INFLUENCE DEGREE AI OF COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

Influence degree	Explanation	Score
Critical	Once the risk event occurs, it will cause great damage to the sustainable development of mixed ownership distribution electricity company, and the entrusted operation will fail.	9
Serious	Once the risk event occurs, it will lead to a substantial increase in the entrusted cost of mixed ownership distribution electricity company, and the difficulty in cooperation, management and service will increase, which may not meet the needs of mixed ownership distribution electricity company.	7
General	Once the risk event occurs, it will lead to a general increase in the cost of commissioning, a general increase in the difficulty of cooperation, management and service, but still meet the needs of some important business development of mixed ownership distribution electricity company.	5
Minor	Once the risk event occurs, it will lead to a small increase in commission costs, cooperation, management and services generally do not increase, etc., the indicators of entrusted business operations can still be guaranteed.	3
Negligible	Once the risk event occurs, there is almost no impact on the implementation of the entrusted operation.	1

TABLE II. RISK OCCURRENCE PROBABILITY BJ OF COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

Probability range	Score	Score
91%-100%	Very likely to happen	9
61%-90%	May occur	7
31%-60%	May occur in the middle of implementation	5
11%-30%	Less likely to happen	3
0-10%	Impossible	1

TABLE III. RISK SCORES OF COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

	Negligible	Minor	General	Serious	Critical
0-10%	1	3	5	7	9
11%-30%	3	9	15	21	27
31%-60%	5	15	25	35	45
61%-90%	7	21	35	49	63
91%-100%	9	27	45	63	81

TABLE IV. RISK LEVEL OF COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

Level	Single risk value	Maximum risk value	Highest value of *n* risk points
Low risk interval	1-9	9	9*n*
Medium risk interval	10-44	44	44*n*
High risk interval	45-81	81	81*n*

TABLE V. OPTIMIZED RISK CLASSIFICATION OF COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

Level	Explanation	Score
Ideal entrusted operation	The overall risk of entrusted operation is small and can be ignored	1-9n
Can be entrusted to operate	Entrusted business risks are general, and can be timely communicated to resolve related issues	(9n+1)-25n
Cautious entrusted operation	The entrusted operation is risky and should be deeply involved in the business implementation process to avoid potential hazards and impacts.	(25n+1)-44n
Suspension of entrusted operation	The risk of entrusted business is high, the entrusted business shall be suspended and the corresponding arbitration and claim shall be initiated.	(44n+1)-81n

Combining risk influence degree a_i and risk occurrence probability b_j of commissioned operation to frame the matrix for scoring, risk scores $R_{ij}=a_i \times b_j$ is as shown as in Table 3.

The entrusted business risk with a score of 1 to 9 is determined as a low risk interval, and the entrusted business with a score between 10 and 44 is determined as a medium risk interval, and the entrusted business with a score between 45 and 81 is determined to be high risk interval.

B. Risk Classification Optimization Model Considering Risk Mean

Assume that there are a total of n risk points (risk matters) for commissioned operation of mixed ownership distribution electricity company, and the risk level is shown in Table 4.

In order to further strengthen the practicality of risk interval division, take the product of average value of risk scores in Table 3 and n as the new demarcation point of the risk interval, which is 25n, as shown as in Table 5.

IV. EXAMPLE ANALYSIS

Taking the maintenance and repair business as an example, the risk of entrusted operation includes five items: Unplanned power outages that seriously affect enterprise production, Harm to distribution network assets and facilities, reducing service life, Unreasonable increases in fees, Service response is not timely, Work bills are less formal. According to Table 3, Ideal entrusted operation 1-45, Can be entrusted to operate 46-125, Cautious entrusted operation 126-220, Suspension of entrusted operation 221-405 for maintenance and repair business of mixed ownership distribution electricity company.

Assume that enterprise that are commissioned to conduct business are assessed in the course of their work, as shown in Table 6.

TABLE VI. RISK ASSESSMENT FORM OF MAINTENANCE AND REPAIR BUSINESS COMMISSIONED OPERATION OF MIXED OWNERSHIP DISTRIBUTION ELECTRICITY COMPANY

Risk matters	Influence degree	Occurrence probability	Risk scores	Order of importance
Unplanned power outages that seriously affect enterprise production	Critical(9)	0-10%(1)	9	5
Harm to distribution network assets and facilities, reducing service life	Serious(7)	61%-90%(7)	49	1
Unreasonable increases in fees	General(5)	61%-90%(7)	35	2
Service response is not timely	Minor(5)	31%-60%(5)	25	4
Work bills are less formal	Negligible(3)	91%-100%(9)	27	3
Risk scores in total	145			

According to the risk assessment result of commissioned operation of maintenance and repair business of mixed ownership distribution electricity company, The enterprise that receives the commissioned business is in the "Cautious entrusted operation" interval, and should be deeply involved in the business implementation process to avoid potential hazards and impacts. It mainly focuses on solving the problem of harm to the distribution network assets and facilities, reducing the service life and unreasonable cost increase.

V. CONCLUSION

The constructed business entrustment risk assessment model of mixed ownership distribution electricity company, considering the risk impact degree and risk occurrence probability of commissioned operation, establishing risk score reference tables for different types of business, and risk of commissioned operation is divided into″ Ideal entrusted operation, Can be entrusted to operate, Cautious entrusted operation, Suspension of entrusted operation″ four categories, has strong practical application value, and can provide decision support for the actual work of mixed ownership distribution electricity company in the future.

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