Research on the Construction of Credit Evaluation System for Safety Performance

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Abstract. In light of the fundamental requirements of the safe development of power grid enterprises, this paper introduces the concept of "credit" to innovatively put forward the concept of "responsibility credit" for the implementation of safety production responsibilities and the establishment of a credit evaluation system for safety performance from three dimensions: integrity, compliance and execution. Owing to the "refinement and implementation of the safety responsibility list, carrying out safety performance credit evaluation, and implementing the safety performance responsibility reward and punishment mechanism", the safety performance management model pertaining to "knowledge, action, evaluation, optimization, performance" is formed to provide a reference for improving the intrinsic safety management in the power grid system.

1. Introduction

In order to ensure the safe and stable operation of the power system and reliable supply of electricity, the National Energy Administration requires that power companies to firmly establish the concept of safe development, to continue to strengthen the supervision of the safety production industry, to abide by the principle of "one in charge of production and business must be in charge of safety", and to fulfill the critical responsibility of safe production. It goes without saying that safety is the lifeline and the top priority of power grid companies. Tightening and compacting safety responsibilities at all levels has become an important management content to ensure power grid safety. However, in terms of "implementation of safety production responsibilities", power grid companies still have certain deficiencies. On the one hand, although enterprises have formulated safety responsibilities norms at various levels, the responsibility system sometimes is only used to evade management responsibility and post-mortem responsibility. The formalized responsibility system has not been integrated into daily work and is not linked to performance evaluation. The "two skins" structure renders the responsibility system somewhat ineffective. On the other hand, the management and control methods of the enterprise are seriously inadequate, given that the responsibility specification has only
formulated the content of responsibility with overly general terms. Meanwhile, the responsibility specification is insufficient when it comes to combining with their business work. There is no clear time point or trace of performance. The lack of monitoring means to ensure that all the staff are performing their duties in the right place further aggravates this issue. Therefore, to implement the safety production responsibilities of power grid companies, it is urgent to build a set of information-based responsibility management and control system. This paper proposes to build such a safety responsibility management and control system that takes credit evaluation as the core, integrates safety responsibility with daily work, and links the results of responsibility with safety rewards and punishments, in an attempt to address the problems in the power grid enterprises.

2. The construction of safe performance credit by introducing the concept of "credit"

The implementation of safety production responsibilities is the prerequisite to the safe and stable operation of power grid enterprises. Apparently, the implementation of safe production responsibilities lays the solid foundation of safe production, and is directly related to the power supply capacity and economic benefits. Traditional safety management focuses on rigid management and specific management. In implementing the responsibility of the safety subject, it stresses upon reflecting the result judgment yet neglects the process differences. To further implement the safety production responsibility system for all employees, the safety responsibility management model is innovated based on the concept of "credit" to effectively break the current management bottlenecks.

“Credit” is a social concept, social norm and social operation system that manifests enriched social connotation. It is open to different interpretation in different disciplines and cultural ideas. In view of the previous researches of credit theory and credit evaluation, this paper intends to explore the construction of a credit evaluation system for safety performance from the perspectives of integrity, compliance and execution (Figure 1).

![Three-dimensional safety performance credit system](image)

Figure 1. Three-dimensional safety performance credit system

Specifically, integrity refers to the basic credibility of employees. It involves moral culture, spiritual literacy, willingness, ability and behavior of the employees in performing safety duties. The basic ability and behavior habits of employees form the basis of the credit level in performing safety duties. Compliance mainly reflects the employee's credit responsibility for safety performance and whether the employee complies with the constraints of safety management. It determines the standard and scope of the employee's safety performance credit evaluation. Execution refers to the ability of employees to abide by safety management rules in their work. It mainly reflects the employees' capability of performing safety duties. Execution is the most intuitive parameter that reflects
employees' capability of safety performance. The introduction of the concept of "credit" presses forward safety management, thereby reflecting that safety management is both a result and a process.

3. General idea of the credit evaluation system for safety performance

The integrated study of the concept of "credit" and safety responsibility management postulates that the construction of a safety performance credit evaluation system should further implement safety responsibility and improve safety management level, thereby improving the "bottom line" and "red line" awareness of safety production. Meanwhile, the safety performance credit evaluation system should focus on the implementation of safety responsibilities, such as the falsification of safety responsibilities and insufficient management and the control methods. The safety responsibility list should be refined, the safety performance credit evaluation should be developed, and the safety performance responsibility reward and punishment mechanism should be executed. In doing so, an integrated management model of “knowledge, action, evaluation, optimization, performance” can be expected to fulfill the safety responsibilities and promote the implementation of safety responsibilities and improve the level of intrinsic safety management in the power grid companies.

When it comes to the construction of the information evaluation system for safety performance, the deconstruction of relevant laws, regulations and system standards should be deconstructed in the first place. Thusly, the concept of "credit" is integrated into the field of safety management from the dimensions of integrity, compliance and execution. In this way, a credit evaluation system can be built for safety performance of power grid companies based on the devised safety responsibility list. Safety reporting, safety ability examination and trace management are included in the evaluation methods. The evaluation results are referred as guidance and the implementation of the responsibility of the main body of safety production is viewed as the fundamental construction (Figure 2). In addition, by developing a safety responsibility evaluation system and carrying out key safety inspections, we summarize a list of negative responsibility credits to comprehensively strengthen the safety supervision of all employees. Other measures are taken to urge employees at all levels to clarify their duties and fulfill their responsibilities.

![Figure 2. Safety performance and credit evaluation system](image-url)
4. Refinement of responsibility list for safety performance credit

When designing the safety responsibility list, we establish a classification structure and clarify the core content in strict accordance with the principle of structured thinking. The standard scores for performance requirements are determined through hierarchical analysis, forming the weight distribution of various matters to ensure quantitative evaluation of safety performance (Figure 3). The safety responsibility list is roughly divided into three categories, including "Company", "Institution", and "Post". On this list, "Company" is the safety responsibility that corresponds to the company level; "Institution" corresponds to the safety responsibility of the organizations, such as departments, divisions, teams and groups; "Post" corresponds to the safety responsibility of positions. The safety responsibility is divided into mainly two types: "dedicated" and "general". Here, "dedicated" refers to a list of safety responsibilities that is only suitable for a specific position; whereas "general" refers to the list of safety responsibilities that is applicable to multiple positions. This term clarifies the scope of application.

Considering the actual situation of business, we should refine and optimize the safety responsibility list to ensure that “content, requirements, records, time” of responsibility fulfillment. In terms of safety responsibilities, we should insist on being pragmatic, rather than reckless and careless. Additionally, all the involved units should carefully summarize and refine the to-be-implemented safety responsibilities in accordance with the actual business condition by carefully sorting out the safety responsibility list. This action ensures that no additional items are disregarded within the scope of responsibilities. Weak operability and empty content should be removed from the list to ensure that the safety responsibilities are executable and manageable. In accordance with the requirements for fulfilling our responsibilities, we should clarify the time nodes and specific items. In terms of performance records, efforts should be made to refine the management traces and to clarify the carriers that could be queried. Moreover, deduction criteria should be formulated item by item.

In order to advance employees’ understanding of their safety responsibilities in the respective positions, enterprises should improve safety integrity, and thus effectively implement the safety responsibility list. In addition, enterprises need to promote the responsibility list level by level, making clear the main responsibilities layer by layer, and forming a liability network from horizontal to vertical. Such effort can ensure full coverage of "leaders, departments, teams, and front lines", and that everyone is well aware of his or her safety responsibilities. Moreover, enterprises could strengthen the implementation of the safety responsibility list by adopting various measures, such as organizing all the employees to sign safety performance commitments, keeping normal record of performance, conducting regular publicity and follow-up evaluation, and establishing positive feedback in the safety performance management mechanism.
5. Implementation of credit evaluation based on the safety responsibility list
The safety performance credit evaluation process can be divided into four steps:

1. Carry out safety work report according to the grading principle. The leadership team, the deputy director in charge of safety production, the safety director, and the person who is in charge of the collective enterprise are required to submit safety reports to the credit evaluation leading group. The safety director and the person in charge of the collective enterprise are required to write monthly reports about the performance of responsibilities, which are clarified in the list. The person in charge of the collective enterprise reports on the management and control of production and the construction plan. The deputies in charge of each unit conduct the review reports according to the list of quarterly safety responsibilities, the key rules and regulations. The person who organizes the leadership team carries out annual or biannual safety reports; the members of the leadership team report the collective safety performance. The safety responsibility list and the key work of the stage help formulate the safety work evaluation standards, and the leading team conducts on-site evaluation of the safety performance of the deputy, the safety director, and the head of the collective enterprise.

2. Regularly organize all employees at all levels to conduct safety rating examinations to convey key regulations and requirements, such as the "Safety Production Law", "Safety Work Regulations", "Safety Rewards and Punishments Regulations", "Safety Accident Investigation Procedures", and other safety production duties and norms. The safety ability rating test for front-line personnel and other management personnel is conducted in conjunction with the annual safety skill assessment test. It is scored on a 100-point scale, and those have less than 90 scores will be deducted from the list of qualified credit evaluation, and will participate in the training once again.

3. Carry out credit evaluation rating throughout the evaluation system. The safety performance credit evaluation management system should be applied in performing dynamic evaluations and credit ratings on each unit. The deputy directors, safety directors, and collective enterprise heads will have deducted points for unfulfilled duties, overdue duties, or irregular records. Besides, deducted points can happen in security work report situation, responsible security incidents, and violations, while increased points can be applied in the handling of emergencies. Specifically, the safety performance credit evaluation is divided into 100 points, and the evaluation score is calculated as 100-deduction value + bonus value. Evaluation scores being greater than or equal to 90 are classified as excellent credit for safety performance, the range from 80 to 90 are classified as good, the range from 70 to 80 are classified as medium, and the scores of less than 70 are classified as poor.

4. Establish a credit evaluation file for the safety performance of all employees. The closed-loop management process should be refined for the credit evaluation of safety performance. The establishment of credit evaluation files for safety performance of various departments, units and employees can help keep track of the implementation of safety performance of all employees in real time. Credit evaluation files could be established based on quantitative indicators and evaluation scores. The safety performance credit evaluation of various departments should be published to units and employees to form a safety performance credit evaluation file from which all employees can consult at any time. All employees are encouraged and stimulated to achieve work safety responsibilities.

6. Improvement of reward and punishment based on the results of credit evaluation
The principles of "process control, heavy rewards and fines, and result-oriented" postulates that the application of safety performance evaluation results should be strengthened. Once the deputy director, safety director, and collective enterprise have a credit rating for safety performance, a key safety inspection will be organized for the unit. Meanwhile, the results of the inspection and the annual performance appraisal management evaluation will be widely reported. The deputy directors, safety directors, and collective enterprise leaders who have a medium or poor safety performance credit rating should provide a formal and rational "explanation" within one week of the release of the results and are expected to accept financial penalty. The credit evaluation of safety performance is reported to the organization department and the human resources department each quarter. The personnel who
have been evaluated as poor performance for two consecutive years are deemed as unsuitable for their positions.

Praise and rewards should be given to collectives, teams, and individuals who can fulfill safe production, effectively prevent major risks, correctly handle complex faults, and efficiently attend to the alleviation of disasters or incidents. In addition, collective and individual rewards should be applied to promptly handle customers' violations of electricity consumption in the anti-theft work, thereby effectively improving electricity safety management of the customers. In order to give full play to the incentives of safety rewards and punishments and to promote the implementation of the safety responsibilities of all employees, we should add more than 70% of the quota to reward front-line members, so as to make sure that the highest level of rewards could enlarge the gap and is no less than twice higher than the average level.

7. Conclusion
The safety performance credit evaluation system is implemented to innovate safety management methods through incorporating the concept of "credit" into safety responsibility management. Safety management systems, standards and other documents are combined with professional management to organically integrate safety responsibilities with enterprise organizations, business processes, job sequences, thereby building a "multiple integration" safety responsibility management model from the perspectives of integrity, adequacy, effectiveness, and seriousness of performance. The real-time tracking and dynamic evaluation of the implementation of safety production responsibilities of all employees can induce a major breakthrough in the traditional pattern of single economic assessment. A reward and punishment mechanism in parallel with dual-track economic assessment and credit assessment is most effective in helping realize the transformation of safety management method from "result-oriented" to "process control". These measures could effectively consolidate the foundation of safety production and improve the safety management level of power grid enterprises.

In this paper, we analyze the construction of credit evaluation system for the safety performance of power grid companies based on day-to-day experience. Credit evaluation is a multi-party, continuous improvement system project which needs to be improved from time to time. As social and economic development pays more attention to the concept of credit, the combination of the policy requirements for the construction of the national credit system, evaluation indicators and evaluation plans can be put forward to create an innovative management model for the new era.

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