

Research on the construction of safety risk management objective system based on causes-means

Yaning SHI, Jin YANG, Yu WEN

School of Information and Communication, National University of Defense Technology, P.R.China,

syn573@163.com

Abstract The objective system of safety risk management is the expected state or result of the safety management activities carried out by the organization to prevent and deal with risk factors and risk accidents within a certain period of time. In this paper, adopting the idea of MBO(Management by Objects), the objectives system built up with a top-down approach is an objectives network based on cause-means. According to the nature and role of risk management activities, the paper points out that the objective system should be constructed from two perspective, that are predictability and systematicness, and followed three principles, namely, advanced nature, comparability, timeliness.

Key words Safety risk management; Objective system; Construction

1 The introduction

Risk management objective is the process by which the organization obtain maximum security with minimal risk management costs. This concept was first proposed by risk management expert Helix Clermont. The different divisions of the specific objective content are mainly due to the differences in the analysis perspective. It mainly includes: to maintain the survival and development of the organization and its members in the case of risk and accident; to help the organization recover from disorder to order; to achieve stable benefits for the enterprise or organization; to reduce the anxiety and fear caused by risk accidents, etc. The similarity of these definitions is reflected in the fact that they mostly focus on the results or effects of a series of risk management actions implemented from the top down. This paper pays more attention to the process of establishing risk management objectives. Based on the comprehensive analysis of the cause of accidents, the paper tries to comprehensively identify the risk factors that may cause the organization to deviate from the safety management objectives, and establishes a risk management objective system in the process of forming effective countermeasures or measures. Therefore, the process of establishing the safety risk management objective system is also the process of continuously analyzing the risk incentives and finding solutions.

2 The connotation of safety risk management objective system

2.1 About the safety risk management objective

To clarify the connotation of safety risk management objective, we should understand the meaning of safety risk management and the definition of problem management. The reason is that the traditional safety management is the passive management mode of "occurrence of accidents - organizational reorganization", and the safety risk management emphasizes the advanced prevention of problems, that means focusing on the problem management. From the perspective of the whole process of management, the safety risk management is an activity that risk managers identify risks, estimate risks, control risks and properly handle risk losses in order to expect that they could obtain maximum safety at minimum cost^[1]. Problem management refers to use problem to optimize management, improve management through problem-driven, prevent small problems from accumulating into large problems, and prevent problems into crisis^[2].

The management of any organization is an objective activity. The management objectives are the starting point and destination of management activities. The risk management objective refers to the sum of the safety objectives set from top to bottom by the organization in a certain period of time under the relevant national laws, regulations and various rules for identifying, preventing and responding to risks, as well as the results or standards to be realized after achieving these objectives. Because the germination, development and evolution of safety problems have a certain quality and quantity of accumulation. So in a broad sense, the

objectives can be also understood as the expected state or phased standard of a series of safety management activities implemented by the risk management organization over a certain period of time.

2.2 About the safety risk management objectives system

The objective of safety risk management is to provide direction for the organization to plan, prepare, implement, and evaluate the prevention and disposal activities. Because organizational management activities usually follow the principle of order obedience. At the management level, potential or existing safety problems with their incentives are usually concluded by the upper management department based on their own job types, technical characteristics, functional tasks, and environmental conditions. Thus the general safety management objective could be set up, and it continue to decide the sub-objective of the lower management department. By analogy, the top-down objectives are more and more specific, forming a connected target network, namely the safety risk management target system. In addition, when formulating and decomposing the objective, it is important to combine security risk management objectives with indicators that measure organizational development. And the responsibilities, rights, and interests of risk management should also be gradually decomposed, so that management objectives are consistent with powers and responsibilities.

It can be seen that the objective system is a objective network derived from the logical analysis of "causes (results) - means". Each lower-level objective is a means to achieve its higher-level objective. The construction of a security risk management target system reflects the comprehensive thinking of the organization on the management of security issues. To build a security risk management target system is to enable organizations at all levels to ensure that response capabilities are matched with security risk disposal tasks in different risk scenarios, and to make the risk prevention resources and response capabilities for organizations are integrated.

3 Perspectives and principles of constructing safety risk management objective System

3.1 The construction perspectives

The perspective of predictability. This is due to the complex situation faced by safety management. At present, some uncertain factors are becoming increasingly complex with the rapid social development and many organizations begin to face more diverse risks. Under certain conditions, safety risks within the organization are likely to extend to the outside. There is an extremely important point in the theory of management psychology: whether it is the natural sciences or the social sciences, many major inventions or innovations are not so much caused by the problem solvers, but rather the discoverers of the problems. Sometimes safety risks are potential and hidden. If we lack awareness of the discovery and reflection of safety risks, we cannot find the risks behind the appearance, let alone to jump out of the limitations of single risks to determine the secondary risks that may be induced. Therefore, when constructing this objective system, we must analyze it with the anticipation, foresight, and forward thinking.

The perspective of systematicness. This is due to the dialectical unity of safety management and organizational operation and development. When constructing the risk management objective system, We must first fully understand the various risks in the organization's activities, fully comprehend the probability and the severity of their losses, and deduce other chain reactions caused by the emergence of risks. we must first comprehensive thorough understanding of the organization activities in various risks and the severity of damage probability loss and other chain reaction caused by risks appear. At the same time, we should implement the risk management plans in a comprehensive and detailed manner, and constantly adjust them according to the actual situation. This is a reliable guarantee for achieving risk management objectives. Therefore, we should try our best to use systematic analysis methods to comprehensively consider various types of risks in each link.

3.2 The construction principles

Advanced nature. We cannot just ensure that the current safety status is the standard for measuring organizational risk management objectives. Instead, we should plan, build, and evaluate the objective system from the perspective of maintaining safety, stability, and long-term development for the organization, and always emphasize the optimization of safety system. The objectives system construction should be based on two benefits, that is, whether it benefits to improving the organization's ability to foresee safety risks, and whether it benefits to improving the organization's ability to respond after safety problems occur.

Comparability. Safety risks may evolve into some safety problems with serious nature and adverse impacts. Therefore, in order to prevent hidden dangers and risks, the safety risk management should focus on the transition from the type of problem response to the type of problem management. This requires layer-by-layer decomposition of safety risk management responsibilities, so that all levels of personnel are assigned a certain safety responsibility. It is worth noting that the responsibilities at each level should be continuous, differentiated and comparable, in order to prevent the decomposition of general responsibility. In addition, the prevention of security risks is often closely related to the refinement level of organizations or departments when they plan regular security work. This also means the safety concept, safety capability and safety culture permeated by the organization or department in the working directly affect the its cope ability when some greater risk occur. Therefore, when designing the objective system ,it should be as specific and quantized as possible .

Timeliness. The safety risk management objective is the state to be reached in a period of time. Without the limitation of time, the objective construction will lose the necessity of existence. Generally speaking, it can be any period required under the established conditions, such as first quarter, one year, five years. Given some major problems are generally characterized by sudden occurrence ,rapid development and evolution, high prevention and requirements, against which the organizations must strengthen their defense, it is decided that it must be a long-term risk management task for the organization^[3]. Therefore, following the principle of timeliness, it is necessary to establish a reasonable period. Usually, according to the actual work of the organization, one year is more appropriate. At the same time, the organization should also clarify the phased prevention and control objectives for major security risks, in light of the adjustments and changes in its work content.

4 Composition of safety risk management objective system based on cause and means

4.1 Classification of the objective system

The objective system of safety risk management can be classified in different ways. According to the level of organization for the safety management , it includes three aspects: high, medium and grass roots. According to the accident causation theory, the accident is mainly attributable to four factors, including human factors, machinery, environment and management. Thus we can analyze the objective system from these four aspects. Moreover, according to the theory of safety management, safety problems exist at the personnel and management level belong to the problem of unsafe behavior, safety problems existing in machinery or materials and environment are the problems of unsafe status. Therefore, it can be divided into safety behavior objective and safety state objective. Moreover, according to the nature of safety risks, the objective can also be divided from technology, equipment, information and safety important section, etc.

4.2 Architecture of the objective system based on cause-means

Judging from the security situation of production activities for various organizations, the causes of security problems are not only extensive but also complex and profound. This determines that the premise of building a risk management objective system is to analyze various types of risk issues comprehensively and objectively, especially to clear the underlying causes behind the problems. Then, according to the type and nature of the cause, the feasible solutions and key measures for problem solving are pointed out in a targeted manner. It can also be said that the objective of risk management is established along with the clarification of the solution.

The reasons can be divided into surface causes, intermediate causes and root causes^[4]. The objectives determined based on surface causes are temporary objectives that are generally short-term and temporary. In addition, if risk problems are complicated, before root causes are found, in order to alleviate the current risk situation, the temporary objectives can be clearly defined. Admittedly, organizations must also identify root causes and use them to determine root objectives. When determining the root objectives, it will also be encountered that although root causes have been found, but there are currently no condition to solve the problem, then it is also possible to determine some more appropriate objectives, namely adaptive objectives. Undoubtedly, different types of risk problems are caused by different reasons. However, from the analysis of reasons to the provision of means, it reflects the basic process of problem management, which is applicable to the construction of different types of security risk management objective system. The specific construction idea is shown in Fig.1.

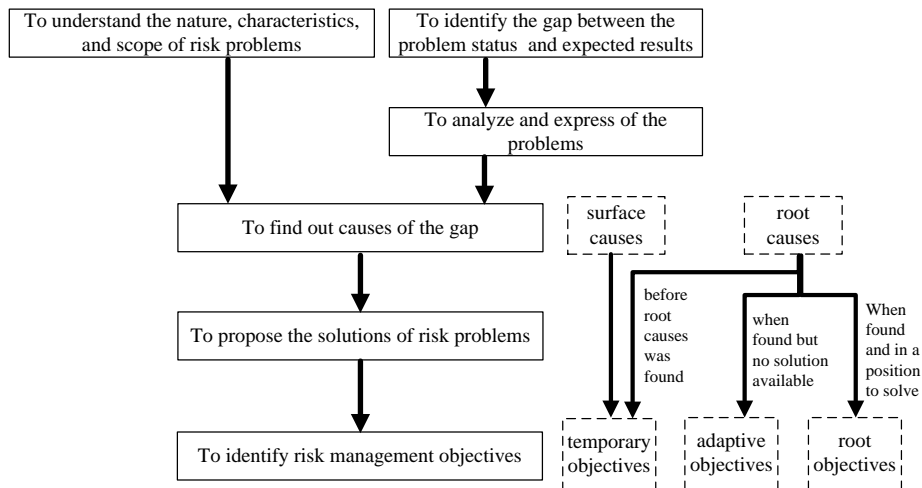


Fig.1 Thoughts on the construction of risk management objectives based on cause-means

As mentioned earlier, the accident causation theory focus on four factors. So the division from the perspective of factors can embody a comprehensive consideration of safety behavior and safety status. Owing to the fact that the construction of objective system means the logical derivation of cause-means, here the safety risk management objective system is considered as the general objective, thus this general objective can be subdivided into five sub-objectives, namely, culture, organization, mechanism, methods and talents. It should be said that these five sub-objectives are also the main means to prevent and deal with the safety risks, as shown in Fig.2. At present, the safety risk management implemented by relevant department should be based on both prevention and elimination. It requires both basic and unconventional means. The finer objectives should be further refined for the five sub-objectives based on the nature, characteristics and impact of the risks. That is to say, it must be highlighted that the response means are pertinent, practical, and effective in the process of establishing the finer objectives.

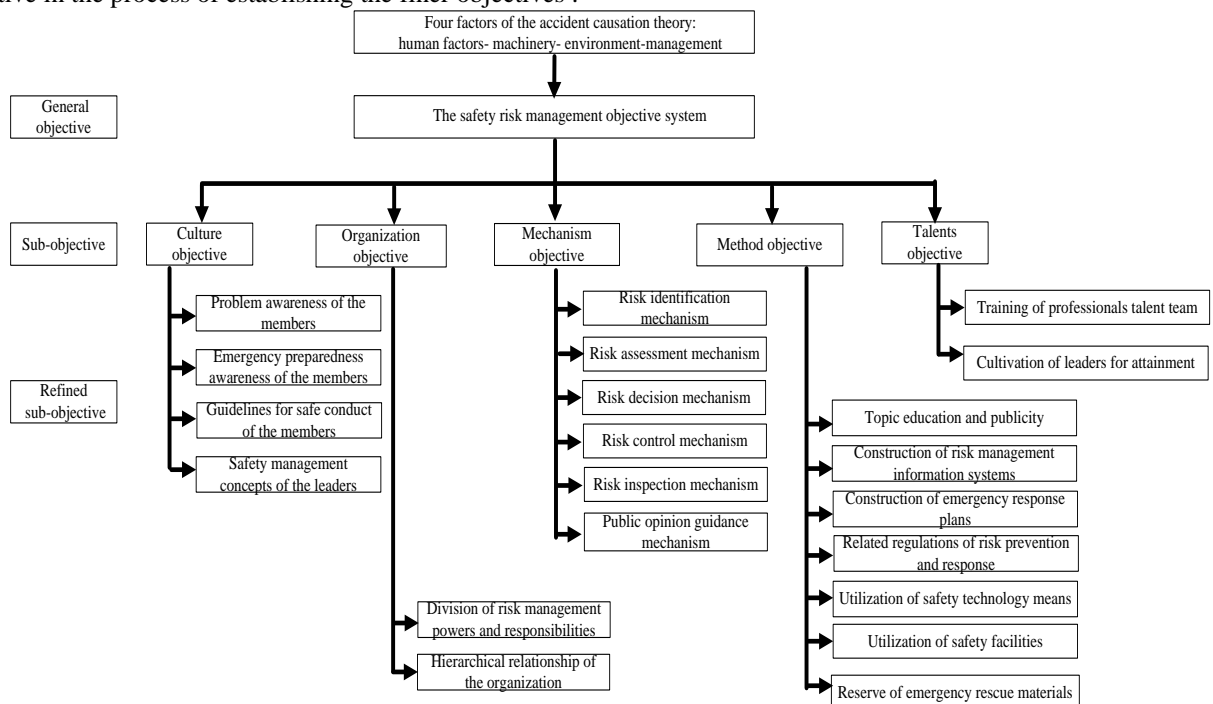


Fig.2 Architecture of the safety risk management objective system based on cause-means

The safety objective of culture is a comprehensive manifestation of safety education, training, attitudes, guidelines and safety management leadership model in the operation of the organization. In addition to visual forms such as warning pictures, slogans, and symbols, the cultural objectives should be based on the basic categories of safety culture, and focus on cultural strategies and ideas to improve the level of organizational

risk management. Specifically, the safety culture sub-objectives mainly include the members' problem awareness, the emergency preparedness awareness and guidelines for safe conduct, as well as the safety management concepts of leaders.

In the horizontal direction, the safety objective of organization should explain the distinction of powers and responsibilities between the safety management organizations and other departments in the risk prevention and response. And in the vertical direction, the objective should solve the problems of risk management ownership and explain the relationship with other safety management organizations. Once the risk becomes a risk factor or a risk accident, the organization will inevitably be in a corresponding emergency state, and the command organization will also be transferred to the corresponding emergency procedures. Therefore, from the perspective of the organization's institutional objective, the task of risk management is to clarify the division of risk management powers and responsibilities and hierarchical relationship in the existing safety management organization.

The safety mechanism objective refers to the operating mechanism of risk preventing and response activities. This objective is proposed as a strategy for problem management, which is related to the efficiency of problem management. Through the construction and innovation of mechanism objective, it is benefited to strengthen the foundation of risk prevention and response, make up for the lack of safety management capabilities and conditions, and play a greater role in the timely identification of risk, rapid decision-making as well as effective solution. The main construction content of the safety mechanism objective: risk identification mechanism, risk assessment mechanism, risk decision mechanism, risk control mechanism, risk inspection mechanism, public opinion guidance mechanism.

The safety method objective reflects the choice of tools for safety risk management. At present, organizations are increasingly focusing on integrating risk management into their development and construction plans. The main reason is that many methods of risk management can often run through the whole process of organizational safety management, and have more advantages in preventive, meticulous and to the point. The construction of safety method objective should highlight risk prevention and disposal, and it mainly include: topic education and publicity, the construction of risk management information systems, the construction of emergency response plans, the related regulations of risk prevention and response, the utilization of safety technology means and facilities, and the reserve of emergency rescue materials.

The talent objective reflects the realistic demand for professional talent team of risk management. Since the ability of such talents requires a high degree of relevance to the nature and environment of the work they are engaged in, the more practical approach is to learn by doing. That is to say to improve risk management capabilities while working and training. In terms of the talent type, it is mainly included the training of professionals talent team and the cultivation of attainment for leaders.

5 Conclusion

The safety risk management objective is not only the result of the relevant risk management activities, but also embodies the status and extent of the safety risk management. Adopting the idea of MBO(Management by Objects), this article constructs five sub-objectives, namely, culture, organization, mechanism, methods and talents, and further refines the sub-objectives in order to ensure effect of the risk management. The objectives system that is built up with a top-down approach is connected like a network. In addition, the process of constructing the objectives system is also the process in which the decomposition of risk management objectives and the use of countermeasures are unified. For risk management organizations, the research has certain reference significance for identifying the risk management objectives step by step based on their own conditions.

References

- [1]Shan Chunchang, Xue Lan. Introduction to Emergency Management :Theory and Practice. Beijing : Higher Education Press,2012: 183.
- [2]Sun Jiwei.Problem Management-Analysis and Resolution of High Level Problems. Beijing : Enterprise Management Publishing House,2014:6.
- [3]Zhang Qindong.Rational Thinking on Scientifically Preventing Major Safety Problems. Beijing :Military Science Publishing House,2014(2):85-88.

[4]Fang Suimin, Hu Zhengxiang. Safety management.Beijing: China Economic Publishing House,1991:14-15.

The author information:

Shi Yaning:

School of Information and Communication, National University of Defense Technology

Xi'an, P.R. China 710106

Tel: 15398076749, 029-84706293