Public security risk prevention and control support key technology research

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Abstract. Risk prevention and control is a process of taking measures to evade and resolve event risks based on risk source identification and risk assessment. Based on the relationship between risk prevention and control and emergency response, this research relies on modern information technology to propose a key technical system for marine environmental security risk prevention and control support including risk prevention and control knowledge base construction and risk prevention and control scheme generation technology. Through technical research, it provides technical support for the safe and efficient response of the marine environment.

1. Introduction
In recent years, the risk prevention and control of emergencies has become a new research hotspot in the field of public security[1-3]. In 2017, the "Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Reform of the System Mechanism for Disaster Prevention, Disaster Mitigation and Relief"[4] pointed out that at this stage, emergency response should focus on one combination and two changes. One combination is the combination of prevent and resist. The two transformations refer to, transform from focusing on post-disaster relief to pre-disaster prevention; and transform from responding to single disasters to comprehensive disaster reduction. Academic research and emergency policies all include risk prevention and control as the focus of emergency response.

The research work related to the emergency response of emergencies has achieved a series of results, mainly focusing on the situation analysis of emergencies and the formulation of emergency response plans[5-6]. Based on this, this paper starts from the relationship between risk prevention and control and emergency response, and relies on modern information technology to propose the key technical system for public security emergency risk prevention and control support, providing technical support and reference for the emergency response.

2. The relationship between risk prevention and emergency response
Risk prevention and control is a process of taking measures to evade and resolve event risks based on risk source identification and risk assessment. Risk prevention and control objects and prevention and
control measures are the two core elements of risk prevention and control. The risk prevention and control object refers to the subject that may generate or exist risks; the risk prevention and control measures refer to the specific methods and means to achieve the risk prevention and control standards.

Combined with the risk concept and risk prevention and control methods, the purpose of risk prevention and control can be simply stated to prevent the occurrence of events corresponding to risks or to a certain extent. From this perspective, risk prevention and control have a close relationship with the stage/degree of event development.

![Figure 1. The relationship between risk prevention and control and event development stage](image)

Specifically, the close relationship between risk prevention/control and the stage/degree of event development can be replaced to some extent by the relationship between risk prevention/control and emergency response. Risk prevention/control and emergency response are two important links during the emergency handling process. Risk prevention/control focuses on the prevention and control measures taken before the emergency occurs, or the emergency has not developed to a certain extent. Emergency response measures mainly refer to emergency measures taken when an emergency occurs or reaches a certain level/scale[7-8]. In this part of the study, we will try to make a scientific and clear segmentation of prevention and control measures and emergency measures, in order to lay a good foundation for the research work of prevention and control knowledge base and prevention and control programs.

3. **Risk prevention/control related key technology systems**

Focusing on the overall goal of risk prevention and control, combined with the current risk prevention and control actual business needs and status quo, the risk prevention and control support technology mainly includes the construction of risk prevention and control knowledge base and the technology of risk prevention and control scheme generation. Among them, the risk prevention and control knowledge base is the key element and foundation of risk prevention and control work, and the scheme intelligent generation technology is an important informational means for efficient risk prevention and control.

4. **Risk prevention and control knowledge base construction technology**

4.1 **Risk prevention and control knowledge base and emergency response**

The decision-making method based on knowledge base provides a new idea for the emergency response process, and is an important link in the process of emergency system construction under the background of intelligent emergency[9]. Applying relevant knowledge to the stages of emergency prevention and preparation, monitoring and early warning, disposal and rescue, recovery and reconstruction can not only improve the efficiency of emergency process operations, but also optimize the scientific organization and storage process of relevant knowledge, and expand the application area and scope of the knowledge base.
4.2 Construction plan of risk prevention and control knowledge base
Firstly, build a risk prevention and control knowledge catalog. Building the catalog should focus on comprehensive emergency response, risk, secondary derivative events, disaster carrier, emergency rescue capability and other factors.

Secondly, carry out research on knowledge base construction technology. Under the guidance of the new emergency concept and the actual needs of the intelligent emergency, the role of the knowledge base in the emergency response and decision-making process can not only stay in the traditional knowledge storage and retrieval stage, but also provide quick retrieval and smart matching function of emergency knowledge. The implementation of these functions requires the support of digital knowledge technology, knowledge rule reasoning technology and knowledge element management technology, etc.

Finally, build risk prevention and control knowledge ontology. The collection and organization of knowledge ontology should combine the relevant knowledge of emergency response, according to the knowledge directory structure. Knowledge related to emergency response to public safety emergencies (including basic knowledge of security incidents, laws and regulations, regulations, plans, cases, expert experience, relevant background data, etc.) is an important source of knowledge for the risk prevention and control knowledge base.

5. Risk prevention and control scheme generation technology

5.1 Structure of risk prevention and control plan
The risk prevention and control plan should serve two situations, normal conditions (without emergencies) and initial stages of emergencies.

Under normal circumstances, the risk prevention and control program focuses on macro industry adjustment, monitoring and forecasting program preparation. The spatio-temporal characteristics of emergencies are an important basis for the formulation of risk prevention and control plans. In addition, the program should also include regional disaster-bearing bodies, emergency rescue capabilities, events chains, etc.

When an incident occurs, the risk prevention and control plan should mainly include emergency information and emergency risk prevention and control measures. The emergency information includes real-time information of the event, development situation information and threats of emergencies in a certain period of time in the future. The emergency risk prevention and control measures include the spatial scope of risk prevention and control, the object of prevention and control, the main department of responsibility for prevention and control, the main measures taken, and the expected effects achieved.

Table 1. Elements of risk prevention and control plan.

| Main elements of the plan | Element description |
|---------------------------|---------------------|
| 1 Basic information and characteristics of the event | Event attributes, event risks, event trends |
|                           | No additional space after a section heading |
| 2 Space and time attributes of risk prevention and control | 1 line space before a subsection |
|                           | No space after a subsection heading |
| 3 Organizational department and responsibilities | The main institutions involved and their main responsibilities |
| 4 Prevention and control procedures and measures | Guide the implementation of prevention and control measures |
| 5 Expected effect of prevention and control measures | Break event chain, control its development, reduce risk level, etc. |
| 6 Other considerations | ...... |
5.2 Multi-dimensional risk prevention and control scheme design

In the risk prevention and control, the risk prevention and control plan template should be designed according to different types, different risk levels and the duration of event, providing sub-events, risk levels, and time-based attributes. The risk prevention and control plan template can provide services for the generation of multi-dimensional risk prevention and control programs with sub-events, sub-risk levels and time-sharing attributes, and provide support for risk prevention and control decisions.

![Multi-dimensional design of comprehensive risk prevention and control scheme](image)

Figure 2. Multi-dimensional design of comprehensive risk prevention and control scheme

6. Conclusion and discussion

From the perspective of emergency prevention and control, the thesis analyzes the relationship between risk prevention and control and emergency response as the important premise and foundation, and constructs the key technical system of risk prevention and control support including risk prevention and control knowledge base and prevention and control program, which may provide reference for emergency response.

With the rapid development of information technology, emergency prevention and control and intelligent emergency are two important research priorities in the field of public security. Nowadays, there are very few studies on risk prevention and control. While carrying out the definition of the basic concepts of risk prevention and control and the construction of related systems, integrating information technology into risk prevention and control research is also a major demand for intelligent emergency response.

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