

# Research on Safety Risk Assessment of Prefabricated Building Construction Based on Disaster Sociology

Ying Li, Xinsheng He

School of North China University of Science and Technology, Tangshan 063210, China

**Abstract:** Nowadays, with the development of the economy and the needs of people's lives, the industrialization and informatization of construction have begun to develop rapidly. The rapid development of China's market economy. The original cast-in-place construction technology has become increasingly difficult to adapt to the new requirements of market economy and social construction development. However, prefabricated buildings are increasingly accepted by society due to their advantages of green environmental protection, low consumption, improved labor efficiency, and standardized production. With the promotion of a series of national policies, prefabricated buildings have begun to develop rapidly. However, in the actual construction process, safety accidents such as high-altitude falls, object strikes, lifting injuries, and collapses are constantly occurring. How to effectively reduce safety accidents has become one of the major problems that urgently need to be solved. Therefore, this article aims to establish a comprehensive and scientific safety risk assessment index system for prefabricated buildings by comprehensively analyzing the characteristics of safety accidents in prefabricated buildings and combining disaster sociology theory for similar projects.

**Keywords:** Prefabricated buildings; Safety risk assessment; Sociology of Disasters.

## 1. Introduction

With the rapid development of China's construction industry, safety accidents are also inevitable. Safety accidents will inevitably have a severe impact on human life, property safety, and social safety. Therefore, risk assessment is crucial. Compared with traditional cast-in-place buildings, prefabricated buildings are more complex and unique, and a comprehensive risk assessment index system requires scientific analysis of prefabricated buildings. This article screens and analyzes the safety risk indicators of prefabricated building construction by reviewing relevant literature and materials. Subsequently, theoretical research was conducted on disaster sociology, supplementing the existing indicator system. This can provide reference for the development of risk response strategies for prefabricated construction enterprises, and has certain practical significance. Prefabricated buildings are complex and unique.

## 2. Construction of Safety Risk Assessment Index System for Prefabricated Building Construction

### 2.1. The method of construction

#### 2.1.1. Analysis and induction of relevant literature

This article uses literature research method to determine the safety risk evaluation index system for prefabricated building construction, and conducts a search on the theme of "Safety Risk Evaluation for Prefabricated Building Construction" on CNKI. After detailed analysis, a total of 17 master's and doctoral papers or core journal papers with the highest correlation and more than 25 citations from 2019 to 2024 were selected.[1] Following the principle of independence, semantically similar parts were merged, and risk indicator factors with a frequency of occurrence greater than 4 were selected. Through the analysis of relevant national standards for prefabricated buildings, the literature research results are summarized from five dimensions: personnel, materials and

equipment, technology, environment, and management. The table1 below shows the results. [2]

#### 2.1.2. Based on the theory of disaster sociology

##### (1) Disaster culture

Culture refers to the way people live and behave under specific environmental conditions, with a certain spiritual pillar and material support. Disaster culture refers to people viewing disasters with a certain spirit, enduring disasters, and eliminating their consequences with a certain behavior. Its core and soul is the concept of disaster. With the progress of science and technology in our country and the summary of people's long-term experience in fighting disasters, the scientific concept of disasters has gradually been established, which is to treat disasters with a scientific attitude and concept. It can transform the experience and lessons of resisting disasters into spiritual wealth, fully exert people's subjective initiative to actively reduce and prevent disasters, and promote the comprehensive development of society. The composition of disaster culture requires three elements: material, institutional, and conscious.

For prefabricated construction enterprises, disaster culture helps to create a safety atmosphere, enabling personnel to establish safety awareness subjectively and actively, strictly abide by regulations, and thereby reduce safety accidents in prefabricated construction. To cultivate this corporate culture atmosphere, three elements are needed: firstly, to meet the working and living conditions of enterprise employees materially, such as the living environment, salary and benefits level, and whether the working hours are reasonable. The favorable conditions will make employees feel a sense of belonging, thus treating work with a more positive attitude and a healthy body, reducing safety accidents caused by fatigue construction or irresponsible operation errors. The second is to establish a systematic and unified safety management system, such as the formulation of various standards and specifications, communication and coordination among departments, regular maintenance and

repair of mechanical equipment, which reduces safety accidents caused by management confusion, mechanical failures, and process errors. Thirdly, ideological guidance is provided to employees to cultivate a safety culture and create a safety atmosphere, such as promoting safety culture, training safety education, and summarizing safety accident experience, which reduces safety accidents caused by weak safety awareness and insufficient construction experience among employees. [3] From this analysis, four evaluation elements related to safety risks in prefabricated building construction are identified: "employee's work remuneration and living conditions," "construction of safety management system," "promotion and cultivation of safety culture," and "summary of accident experience."

#### (2) Disaster psychology

Disaster psychology refers to the inner experience of oneself and social conditions under disaster conditions, and is a comprehensive psychological phenomenon with rich connotations. It is composed of factors related to psychological processes and psychological characteristics, the former being cognitive processes, namely the perception and perception of disasters; Emotional process, which refers to the emotional response of individuals to disasters and their consequences; Intentional process refers to the behavioral inclination of individuals towards disasters. The latter is a psychological phenomenon characterized by beliefs, abilities, and temperament under disaster conditions, and disaster psychology will inevitably constrain human behavior under disaster conditions.

#### (3) Disaster rumors

Disaster rumors are a social and psychological phenomenon related to disasters. It is a product of the combined effects of psychological, natural, and social factors. Psychological factors refer to people processing and processing the information they absorb based on their own psychological needs, while natural factors are the characteristics of disasters themselves, and social factors are the stability of social life and order.

With the increasing complexity and scale of prefabricated construction projects, construction accidents are difficult to completely avoid and have suddenness and uncertainty. Information related to accidents will gradually enter the public's perspective. After processing and dissemination, the public will engage in blind behavior based on these distorted and untrue information, causing a public opinion crisis and further deepening the severity of engineering accidents and disasters. So, after the accident, it is crucial for the relevant parties of the engineering company to provide professional explanations for public opinion related questions. [4] In addition, the credibility and authority of information issued by engineering stakeholders are also important factors affecting the public's judgment. From this analysis, two evaluation elements, "credit of engineering enterprises" and "degree of construction visualization", were identified.

#### (4) Disaster awareness

Disaster awareness refers to the consciousness formed by the negative factors in disaster psychology that occur before and after a disaster. In prefabricated building construction, the general contracting company is usually a large enterprise,

with projects in many places, and even multiple projects in a region, and the back and forth scheduling between projects is also common. When safety accidents or disasters occur in different projects within the same company, on-site personnel of other projects may also develop a sense of fear, which can seriously affect the work status of on-site personnel and cause safety accidents. Based on this analysis, the evaluation element of "impact degree of accidents in other projects of the general contracting unit" is derived.

#### (5) Disaster ethics

Disaster morality is an ideology of morality, composed of people's emotions, cognition, and intentions. It directly guides and motivates people's behavior before and after disasters, such as selflessness, group consciousness, heroism, etc. Throughout the entire process of resisting disasters, especially before they occur, moral education and training for people are of great significance in reducing the losses caused by disasters. Cultivating and improving the moral level of prefabricated building management and construction site technical personnel can enable workers to have a higher sense of warmth and responsibility towards their work, thereby strictly adhering to standard specifications and relevant laws and regulations, implementing supervision and inspection, and reducing safety accidents and disasters in prefabricated buildings. From this, the evaluation element of "professional ethics literacy of enterprise personnel" can be analyzed.

#### (6) Social comprehensive defense against disasters

The comprehensive social defense of disasters includes multiple aspects such as prevention, resistance, and relief. It combines pre disaster prevention, during disaster response, and post disaster relief in order to minimize the losses caused by disasters to the greatest extent possible. This new strategy is suitable for the progress of human society and represents a period of transition from passive tolerance to active disaster prevention and reduction. In comprehensive defense, material means, spiritual means, and institutional means are indispensable. Material means refer to the materials and other material materials of the disaster, spiritual means refer to the promotion of the disaster, cultural literacy, and improvement of physical and mental qualities, and institutional means refer to a comprehensive and effective emergency system. When an accident occurs, sufficient emergency material reserves, detailed and reasonable emergency plans, and a sound and efficient emergency organization system can maximize the reduction of life, economic, and social losses caused by prefabricated building safety accidents. [5] It can also enable construction enterprises to recover and rebuild in the fastest possible time, thus continuing to contribute to social development. From this, the evaluation element of "the construction of emergency management system" can be analyzed.

## 2.2. Index System for Safety Risk Assessment of Prefabricated Building Construction

After analyzing previous literature and obtaining preliminary evaluation elements, the risk of safety production accidents in prefabricated buildings was analyzed and supplemented using the content of disaster sociology theory. The results are shown in Table 1 below.

**Table 1.** Index system for safety risk assessment of prefabricated building construction

Target layer	Primary indicators	Secondary indicators
Safety risk assessment of prefabricated building construction	Personnel	Technical level of construction and management personnel
		Safety awareness of construction and management personnel
		Wearing of safety protective equipment by construction personnel
		Work remuneration and living conditions of personnel
		Professional ethics literacy of enterprise personnel
	Materials and equipment	Selection of equipment machinery
Maintenance and repair of equipment and machinery		
Quality of prefabricated components		
Technology	Accuracy of prefabricated component numbering or labeling	
	Temporary support and safety protection level	
	The accuracy of positioning and installation of prefabricated components	
	Security detection technology	
	The rationality of construction plan design	
Environment	The rationality of setting the position of component lifting points	
	Visual degree of construction	
	Climate and environment at the construction site	
	Size of construction site space	
Administration	Impact of accidents on other projects of the general contracting unit	
	Safety Credit of Engineering Enterprises	
	Construction of emergency management system	
	Summary of accident experience	
	Cultivation and promotion of safety culture	
	Efficiency of information transmission among all parties	
	Development and implementation of safety management system	

### 3. Research Meaning

Most construction production accidents and disasters occur within the social life scope closely related to people, posing a serious threat to people's life and property safety, as well as social order stability. Therefore, they have obvious social characteristics. Disaster sociology is an applied sociology that studies the social phenomena and behaviors that occur during the occurrence, consequences, and entire process of disaster reduction from a sociological perspective. Each discipline has its own conceptual system, and disaster sociology refers to human, disaster, and social development, as well as their interrelationships. Under the basic concepts, disaster mechanisms, disaster culture, disaster concepts, disaster psychology, disaster awareness, disaster morality, disaster communication, social issues during disasters, and social control during disasters are derived. These are unique concepts of disaster sociology. This article supplements and improves the safety risk assessment index system for prefabricated building construction from three aspects: disaster culture, disaster psychology, and comprehensive social defense against disasters, which is in line with the scientific and comprehensive construction of the index system.

### 4. Summary

This article aims to improve, scientifically, and reasonably evaluate the safety risk assessment index system of

prefabricated building construction based on the theory of disaster sociology, in order to provide reference for the safety risk assessment of prefabricated building projects.

### References

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