

# Research on Influencing Factors of Urban Rail Transit Operation Safety Management Mode

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## Abstract

The safety management of urban rail transit has always been an issue of great importance in the industry. The establishment of standardized safety management mode still needs to be discussed and studied, but the analysis of the influencing factors of safety management mode is the first step to study the management mode. This paper analyzes the influencing factors of the safety management mode of urban rail transit operation through the on-the-spot experience as a passenger and the actual investigation as a staff, and obtains the analysis of human factors, equipment factors, institutional factors and cultural factors, hoping to be helpful for the further study of the safety management mode.

## Keywords

Safety Management Mode; Influencing Factors; Urban Rail Transit Operation.

## 1. Introduction

In recent years, urban rail transit has become the main mode of transportation. In 2022, many new lines will be added in major cities, especially in Hangzhou during the Asian Games. In this context, the safety management of major rail transit enterprises is particularly important, and the implementation requirements of rail transit operation safety management mode will be higher. When determining the operation safety management mode, we need to focus on its influencing factors.

## 2. Current Situation and Problems of Safety Management

### 2.1. Safety Management System Needs to be Improved

The development of China's production safety laws and regulations has been tending to be perfect. Laws, regulations, regulations and other legal documents are continuously ensuring the social and economic development. The laws and regulations related to work safety include constitution, criminal law, civil code, work safety law, occupational disease prevention law, etc., among which the laws, regulations and rules related to work safety of urban rail transit include urban rail transit operation management measures and urban rail transit management regulations formulated by various localities. In terms of the formulation and implementation of laws and regulations, the safety laws and regulations system of urban rail transit is not perfect. In recent years, the legal construction and operation of rail transit in China lag behind. For example, many urban rail transit stations or cars are not allowed to eat, but the mandatory requirements of this regulation are not fully implemented, and the phenomenon of eating snacks is still common, which needs to be constrained by moral quality.

The safety standard has not been systematized. There is no unified operation standard in the operation and management industry of urban rail transit, there is no unified specification for the process of safe operation, and the construction of equipment and facilities is not

standardized. There is a lack of legal publicity related to urban rail transit. The legal knowledge of urban rail transit is not well publicized and mobilized in the whole people, which leads to the reports of bad social phenomena in the legal news and people's livelihood news.

## **2.2. Personnel Quality Needs to be Improved**

Subway and light rail passengers are generally office workers, especially in large and medium-sized cities. During rush hours, it is normal for passengers to be crowded in stations and carriages. During this period, passenger conflicts cannot be completely avoided. On the one hand, the conflict among passengers is caused by the internal management of the station, such as passenger injury, misunderstanding and quarrel between passengers and staff. At this time, passengers need to improve their moral cultivation, understand the scope of responsibilities and rules and regulations of the service industry, abide by the law and act in accordance with the rules; on the other hand, the conflict between passengers, crowding and uncivilized behavior occur from time to time. The quality level of passengers is different, which requires mutual understanding and high moral standards without violating laws and regulations. Passengers need to be comforted, and the convenience items inside the station need to be fully prepared.

It is equally important to improve the professional level of the staff. In addition to standardized operation skills and knowledge, service industry also needs good working attitude. "Cross civilized language" and "service gesture" are required by daily work, and are also essential elements for communication with passengers. Improving the psychological endurance of the staff is also a major requirement of the urban rail service industry. It's hard to avoid the psychological pressure of the driving profession, which often involves the safety of hundreds of people's lives and property, and the mental health of the staff is also an important aspect to be paid attention to.

## **2.3. Operating Equipment Needs to be Stable**

In the urban rail transit station, there are some equipment and facilities that are prone to passenger injury, such as platform screen door, gate, escalator, etc. when passengers pass through such equipment, they are prone to injuries such as people and objects on platform screen door, people on gate, escalator sudden stop, etc., as shown in Figure 1. The sensitivity of passengers to such equipment is not high, in addition to the need for station staff to pay more attention to such equipment and facilities, more attention should be paid to Need professional personnel for daily maintenance. The construction of rail transit lines requires a lot of money, and the equipment and facilities purchased at the initial stage of construction will inevitably be damaged over the years. Therefore, the installation and updating of equipment, regular maintenance of system operation, regular maintenance of train operation monitoring equipment and regular maintenance of turnout track are the daily work of urban rail transit industry, but the phenomenon of passenger injury is difficult to avoid, which requires multi pronged and joint efforts Protect the safety of passengers' life and property.



**Fig 1.** Platform screen door jammed

#### **2.4. The Emergency Plan should be Complete**

An important part of rail transit safety management is to control unknown risks in advance, that is, the setting of emergency plans. In stations where work is closely related to safety, it is necessary to be vigilant at all times, to foresee the potential safety hazards and Countermeasures during the shift, and to fully plan the emergency mode and steps within the controllable range. The emergency plans often practiced in the station include: passenger injury, large passenger flow, suspicious items, fire, etc. the control and implementation process of the plans are not the same in major rail transit, and the response measures have their own characteristics. But the key lies in the control of the proficiency of the station emergency plan, which needs to be in place, that is, the familiarity of the station staff with their own responsibilities. In addition to the need for theoretical aspects, daily assessment, questioning, more attention to practice, that is, the drill plan. This requires a high degree of cooperation of all posts in order to deal with the emergency completely in a short time.

### **3. Analysis of Influencing Factors**

After describing the current situation of rail transit, the influencing factors of its safety management mode are summarized as follows.

#### **3.1. Personnel Factor**

People's subjective initiative determines that people occupy the largest proportion in safety management and operation. In security issues, the main aspect of understanding contradiction is that even a highly automated system can not avoid human intervention and can not be completely free from human manipulation and control. This not only reflects that the station staff should first control themselves and do their duties in place, but also reflects the subjective factors of passengers and needs to improve their control.

Human factors mainly include internal and external factors. Internal cause refers to the factors related to people's basic quality, such as physiological factors, psychological factors, individual quality, cognitive level and skill level. External cause refers to the production practice directly affects the individual's mood, physical condition and mood, mainly including external environmental factors, education and training factors, management factors and social training factors.

### 3.2. Equipment Factor

The internal operation equipment of rail transit is diverse, mainly including communication equipment, signal equipment, rail equipment, control equipment, fire-fighting equipment and power supply traction equipment. The operation mode of the equipment is the overall operation, so once there is a problem with one equipment, it will affect the operation of other equipment, and eventually pose a threat to the safe operation of the track.

With the continuous improvement of technical level, the degree of equipment automation will continue to improve. The problem faced by urban rail transit operation is that once the automation link fails, the test difficulty for staff will increase, and the probability of accidents will also increase. Therefore, while considering the evolution of equipment first, we should not give up the training and learning of traditional means.

### 3.3. Institutional Factors

In order to improve the safety management mode of China's urban rail transit, it is necessary to establish a complete and civil management system in terms of personnel management and order issuance. In terms of traffic safety, it is necessary to establish an integrated traffic dispatching command system with level by level responsibility and unified command, so as to achieve coordination and cooperation among all posts; in terms of fire safety, it is necessary to coordinate with municipal and fire departments to carry out all-round three-dimensional drill plan, so as to achieve the combination of prevention and control; in terms of public security, it is necessary for all stations and public security organs to fully cooperate, and auxiliary police should be stationed Arrow.

For the possible crisis and hidden danger on the rail line, the station is taken as the basic unit, and the whole urban rail transit network is covered by the point line and line plane, so as to formulate a unified emergency plan. In daily work, the study and exercise of emergency plan should be normalized and standardized.

### 3.4. Cultural Factor

It is the local culture that affects a generation. The deep-rooted ideas exist in people's heart and are difficult to change. Therefore, it is necessary to strengthen the safety culture education of citizens and make each individual pay attention to safety management. Strengthen the internal safety culture publicity of the station, as shown in Figure 2, so that passengers can easily pay attention to the elements reflecting safety; strengthen the rail transit line safety training, in addition to the three-level safety training, special work education and professional knowledge education of the rail transit system, the safety awareness should also be engraved in the mind.



Fig 2. Publicize the civilized and safe riding code

## 4. Conclusion

Through the analysis of the factors affecting the safety management mode of urban rail transit from different angles, we can know that the human factor accounts for a larger proportion, the equipment factor and the system factor need to be formulated and updated by human factors, and the influence of cultural factors is more like precipitation and accumulation, which needs to improve the national quality and moral cultivation level as a whole. Standardizing the safety management of urban rail transit has a long way to go, which needs the overall cooperation of all aspects.

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