

# Organizational and managerial aspects of ensuring the stability of a security system in the event of emergency situations

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**Abstract.** Organizing and ensuring the stability of the security system in the event of emergency situations, including fire safety, is a direct task of the state and consists of creating and controlling conditions to minimize the risks of the occurrence and manifestation of natural and man-made emergencies. In order to minimize losses in the events of ignitions and fires, as well as to take measures to prevent them, a State Fire Service has been created and is functioning, which has federal and regional levels of organization and monitors fires, organizes and carries out fire extinguishing, and also uses measures to control and verify fire safety, promote the rules of appropriate safe behavior of citizens in everyday life and at work.

## 1 Introduction

One of the main functions of the state is to ensure public safety, where the system, along with crime prevention and the fight against natural disasters, also includes fire safety (Fig. 1) [1-3]. The scope of fire safety tasks includes protecting an object from possible fire and thereby reducing all possible ignition risks associated with this object, bringing them to levels not exceeding permissible values [4, 5].



**Fig. 1.** Functional composition of a fire safety system.

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## 2 Research materials and methods

There are various types of fire protection in Russia, where the State Fire Service (SFS) is the integrating force in the fire safety system. It acts as part of a block whose focus is ensuring the security of the individual, society, and the state altogether. In addition, the SFS performs a coordinating function, regulating the activities of various types of fire protection.

In addition to eliminating fires of varying complexity, fire rescuers have other professional functions. Let us examine them in more detail.

1. Prevention. Fire safety is a state of various protected objects in which the occurrence of a fire is minimized as much as possible, and if it does occur, it will be eliminated. At the same time, important attention is paid to preventive measures aimed at preventing and avoiding combustion and fires [6]. Preventive fire safety measures include:

- organizing and forming the means, tools and equipment that are necessary to extinguish fires;
- formation of evacuation points and safe places for the population and their properties in case of fires;
- development of surveillance and monitoring systems for prompt detection of sources of fire or situations of fire safety rules violation;
- installation of alarms, automatic means of independent fire extinguish (automatic water sprayers, gas fire extinguishing modules, etc.);
- carrying out measures aimed at preventing the occurrence of fire causes.

2. Saving people and property. The main goal of the fire department is to preserve the life and health of people in emergency situations, which means evacuating them from dangerous zones [7]. Evacuation is carried out through the use of special technical means and consists of removing people from the danger zone along evacuation routes specially prepared for this, including carrying them out on stretchers if necessary, as well as descending along fire escapes (stationary, automatic or manual) when exits are cut off by fire.

After evacuation measures the fire brigades start to save property – human life comes first.

3. Fire extinguishing. Depending on the classification and type of fire ignition, it is eliminated in several ways: mechanical flame failure; blocking the access of oxygen, including using foam, powder compositions and non-flammable substances; chemical inhibition; cooling (liquid or various saline solutions are applied to the source); dilution of substances; fire extinguishing strip.

In addition to directly eliminating the fire, flammable liquids are drained from the area where it is spreading. Additional defenses are also being installed.

4. Propaganda. Representatives of the fire service are engaged in propaganda activities aimed at explaining measures to prevent fires and fire extinguishing rules, thereby informing the society about safety issues. This information is conveyed to the population through the media, visits to schools, universities, and other educational institutions [8, 9].

## 3 Results

Ensuring fire safety is a direct and integral task of the state and consists in creating and controlling the conditions for carrying out the labor activities of the population, enterprises and organizations, while minimizing the risks of ignitions and the possibilities of fires spreading. For this purpose, a state fire service has been created and operates, which has two levels of organization – federal and regional (within the constituent entities of the federation) and monitors fires, organizes and extinguishes fires, and uses measures to

control and verify fire safety, promote the rules of appropriate safe behavior citizens in everyday life and at work.

In the Rostov region there is a territorial subsystem of the unified state system for the prevention and elimination of ignitions and fires. This subsystem combines the management forces and means of the Federal Fire Service for the Rostov region (FFS RR), executive authorities of the Rostov region, municipalities, as well as organizations whose tasks include providing fire protection to the population and territories of the region.

The territorial subsystem operates at the regional, municipal and local levels, as well as within the framework of the tasks provided for by its activities; carries out liquidation of emergency situations of an interregional and federal nature that affected the territory of the Rostov region. All structural hierarchical elements of the subsystem organize and carry out their activities to prevent and combat ignitions and fires within the framework of federal and regional legislation.

Fire and rescue teams are deployed according to the size and density of the population of the region to cover the entire city and municipal areas of the region and move forward to put out fires in the shortest possible time. The localization centers of fire and rescue teams are the cities of Rostov-on-Don, Volgodonsk, Shakhty, Kamensk-Shakhtinsky, Novocherkassk, Taganrog, Salsk, Millerovo and the village of Veshevkaya. Available data on the functioning of the fire service of the Rostov region make it possible to identify its effectiveness in recent years, and for certain positions – in a longer period.

In 2022, in order to increase the coverage of the territory of municipalities with fire protection and reduce the time it takes for fire crews to arrive at the scene of a fire, new fire stations were created as part of the regional fire service in the Tatsinsky, Ust-Donetsk and Chertkovsky districts. Modular fire station buildings were built, fire-rescue vehicles, equipment, tools and fire extinguishing equipment were purchased.

Fires are one of the types of emergency situations. They can be both technogenic (anthropogenic) and natural (for example, landscape fires) and can often be combined with other events.

Since many emergency situations are complex and can include several different incidents (for example, an explosion at an enterprise, accompanied by a fire and subsequent detonation of stored explosives), fires often cannot be identified as a separate type and are considered as an integral element of such situations.

The causes of fires in the Rostov region are varied. They are established during the examination and investigation after fire extinguishing and interviews with witnesses and victims are completed. Among the dominant causes of fires in the region, three can be identified (as the number of fires decreases): careless handling of fire accounts for about half of all fires, careless smoking, electrical equipment and domestic appliances.

The number of fires due to arson is also significant. The objects of fires are also diverse, but among them, open storage areas of various material assets and residential buildings dominate.

Among the external factors that determine the functioning of the state fire service, a group of socio-economic, territorial planning factors should be highlighted.

Socio-economic factors include:

- condition of the housing stock of settlements, the degree of their deterioration and landscaping;
- the level of well-being of the population, the financial capabilities of the population in housing repairs and renovation of communications;
- level of provision of housing stock with means of fire detection and fire extinguishing;
- level of education and culture of the population, information services, criminalization of society and the spread of antisocial phenomena.

Territorial planning factors include:

- the nature of territory development and architectural and planning features of settlements;
- level of development of transport and engineering and communal infrastructure;
- growing architectural complexity of buildings;
- increase in the number of storeys and an increase in the number of high-rise buildings in urban areas;
- increasing the area of industrial and civil facilities;
- failure to comply with fire safety standards during construction and operation stages;
- increased transport tension in cities due to increased traffic flow;
- difficulties in interaction between the fire service and municipal engineering and communal services.

Thus, territorial planning factors have an important influence on the risk of fires. These include the degree of economic development of the territory, and therefore the development of infrastructure, the presence and location of fire departments, fire hydrants, water filling stations for replenishing water supplies when extinguishing both man-made and natural fires. For example, the presence of narrow streets in cities (especially in their historical parts) impede the ability of rapid passage of fire trucks and the speed of deployment of fire and rescue operations in the event of fires in old building developments. Multi-storey buildings in cities pose an additional fire risk, since special types of fire equipment are needed to extinguish fires and rescue residents of the upper floors. The low overall level of infrastructure provision in the territory also complicates the functioning of fire departments.

The behavior of the population itself significantly complicates the fire-fighting functions of the FFS RR. A common cause of fires is careless handling of fire. This is often due to non-compliance with fire safety measures at home, at work, on vacation, and in nature. To prevent fire situations caused by people's neglect of fire safety rules, fire service employees take effective measures together with municipal administrations, including work to counteract the burning of dry vegetation, patrolling the territories of municipalities, etc. In the fight against forest fires, it is important to strengthen inter-institutional interaction between management structures responsible for the fire situation and the fight against ignitions in the natural environment.

Summarizing the analysis of the activities of the fire service of the Rostov region, we can assess its functioning as quite effective. The region's fire departments are constantly guarding the safety of the region's settlements and quickly respond to fire emergencies, which allows them to save lives and preserve property and buildings. As a result, it is the fire service and fire protection that make a significant contribution to ensuring the safety of the population and economic facilities of the region.

## **4 Discussion**

In order to effectively operate the fire service in the Rostov region, it is important to equip units with the necessary fire extinguishing means, special equipment and machinery. Firefighting equipment is in constant contact with aggressive external environments and is intensively used, which causes its failure, the need for repairs and maintenance in the required performance characteristics to be able to fight fires. Acting as the main assets of the fire service, these means, and equipment require systematic updating and the purchase of new types.

FFS RR systematically receives new types of equipment and fire-rescue equipment. At the same time, it is important that the renewal of the material and technical support of the fire service does not lag behind the increase in the dangers of fires and damage in the face of increasing risks of their spread and the occurrence of fire emergencies due to the spatial growth of settlements, the increase in the number of residents in them, and the

intensification of multi-storey construction. In connection with this, the need for large-capacity tank trucks, foam extinguishing vehicles, firefighting lifts and ladders is also growing. Equipping fire brigades with special equipment allows their employees not only to perform their professional actions, but also saves their lives in unforeseen situations involving with the collapse of building structures or the sudden spread of fire and its transition to an uncontrolled stage.

Considering the annual high risks of forest fires spreading in the Rostov region, equipping special equipment capable of use in forests and rural areas remains relevant. This also applies to firefighting aircraft, which allow firefighting to cover large spaces in hard-to-reach areas. It is also important to use specialized equipment for this.

In modern conditions, the use of robotics is becoming important, which replaces the direct participation of a person in the process of extinguishing fires and transferring his functions only to the level of coordination and management of this function. For this purpose, mobile fire extinguishing installations with robotic gas-water extinguishing installations are used; multifunctional fire-fighting robotic systems that allow work in high-temperature zones with the ability to dismantle building structures for access to the combustion zone and delivery of fire extinguishing agents.

In the Rostov region, measures are constantly being implemented to improve the material and technical base of fire and rescue units.

The material and technical equipment of the FFS RR is directly related to the financing of its activities. Financial resources allow not only to purchase new equipment and update the fleet of special vehicles, but also to develop research and work to invent new types of firefighting equipment that consider its practical specifics.

The implementation of research, engineering and design work of a search and inventive nature in the field of fire safety, as well as the functioning of the entire FFS system, faces the problem of personnel training. It cannot be said that the service is experiencing a personnel shortage, but the search for promising professionally competent employees is carried out constantly. Specialized universities also aid in this regard.

Personnel training for the fire service should be more practice-oriented, i.e. aimed at developing practical skills in identifying, preventing ignitions, and extinguishing fires. Important in this respect is the transfer of experience between fellow firefighters, which helps them not only share skills in behavior in specific emergency situations, but also formulate the necessary actions at the level of stable algorithms.

Sets of practical training allow you not only to improve skills such as dexterity and speed of action, but also to strengthen the moral and psychological atmosphere in the team, learn to understand colleagues and work effectively in a team, and increase stress resistance. Conducting training allows you to predict various non-standard situations that firefighters may encounter in a real combat situation, since each specific fire is purely individual in terms of its course, and therefore requires an individual approach in making the right tactical decisions when extinguishing it and eliminating the consequences.

One of the approaches used in managing the fire service of the Rostov region is a program-targeted approach, which consists in developing and approving service development programs, establishing on their basis plans for achieving projected development indicators, and implementing appropriate measures to achieve them within a specified time frame.

In accordance with the legislation in the Russian Federation, appropriate structures have been created that are responsible for fire safety. They differ from each other, but they have one goal – to protect people from fire. The main elements of the countries' fire safety system are state authorities and local governments, organizations, citizens taking part in ensuring fire safety (Fig. 2).



**Fig. 2.** Main elements of the fire safety system in the Russian Federation

## 5 Conclusion

Ensuring fire safety is a direct and integral task of the state and is comprised of creating and controlling the conditions for carrying out labor activities of the population, enterprises and organizations, while minimizing the risks of fires and the possibility of fires spreading. For this purpose, a state fire service has been created and is functioning, which has federal and regional levels of organization and monitors ignitions, organizes and extinguishes fires, and uses measures to control and verify fire safety, promote the rules of appropriate safe behavior of citizens in everyday life and at work.

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