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Ivanov, Martin Lyubomirov; Chow, Cheuk Lun

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## Article

# Fire and Rescue Services Reconfiguration for Better Dealing with Post-Flashover Building Fires

Martin Lyubomirov Ivanov <sup>1</sup> and Cheuk Lun Chow <sup>2,\*</sup>

<sup>1</sup> Firefighting and Rescue Operations Sector at the Seventh Fire Brigade of the Fire Safety and Civil Protection Capital Directorate, Ministry of the Interior, 1000 Sofia, Bulgaria; mli\_90@abv.bg

<sup>2</sup> Department of Architecture and Civil Engineering, City University of Hong Kong, Hong Kong SAR, China

\* Correspondence: elize.yeung.polyu@gmail.com

**Abstract:** The reconfiguration of fire and rescue services is the focus of this research. The main purpose is to propose an alternative organizational model for better dealing with post-flashover building fires. The primary source of empirical information is a survey involving 267 managers from the Bulgarian fire and rescue services to gather insights. The research methodology meticulously encompasses the identification of changes concerning the efficiency and effectiveness of the fire and rescue services, the discernment of inherent challenges, the definition of specific factors and criteria relevant to their activities, and the determination of strategic priorities. The goal is to suggest a new, more efficient way to organize these services in Bulgaria, whose approach can be applicable to other contexts in similar conditions as well. The proposed model suggests that the Bulgarian fire and rescue services should work independently from the Ministry of Interior as the State Agency under the Council of Ministers. In addition, a comparison between this newly proposed model and the current one is conducted to highlight its potential advantages.

**Keywords:** fire and rescue services; reconfiguration; postflashover building fires; Bulgaria; survey; organizational model; state agency



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## 1. Introduction

In modern, dense urban landscapes, people inhabit enclosed compartments. The outbreak of fires from various causes, including carelessness, arson, and terrorism, underscores the urgency of prioritizing compartment fire safety and enhancing fire and rescue services for better dealing with post-flashover building fires. Thermally insulated buildings with lower Overall Thermal Transfer Values [1–3] will have a shorter time to flashover. A substantial challenge for the fire and rescue services represents their capacity to keep up with the times and, in case of need, to have the opportunity for quick and timely reconfiguration of their activities in response to the changing conditions. In the realm of managing post-flashover building fires, especially in modern structures like tall buildings, there is a growing emphasis on augmenting the efficiency and effectiveness of fire and rescue services. While active and passive measures serve as vital components, the complexities of such infernos necessitate a well-coordinated and agile response. These emergencies call for the seamless integration of firefighting tactics that go beyond containment and extinguishment.

Fire and rescue services are now challenged to swiftly adapt to the evolving nature of these fires, leveraging advanced techniques, equipment, and training. Their expertise should extend to efficiently navigating smoke-laden environments, strategically accessing fire-affected areas, and orchestrating rapid yet orderly evacuations. Furthermore, the synergy between building management and fire and rescue services becomes paramount. Collaborative efforts encompass regular joint drills, the exchange of critical information, and streamlined communication channels. This collaborative approach, coupled with a continuous learning culture within fire and rescue teams, ultimately equips them to effectively navigate the intricate challenges posed by post-flashover building fires.

Effective protection of the population and the national economy in the event of fires and other emergencies is achieved by reducing vulnerability, minimizing harmful effects, and ensuring a rapid recovery. Theoretically, the place of fire and rescue services is undoubtedly under civil protection management. If, in turn, the place of civil protection has to be determined in the national security system, which includes internal and external security, there is no doubt that civil protection shall be placed as part of internal security. Two possible options for positioning civil protection and fire and rescue services exist in the internal national security system. The first approach is that, in addition to the traditional four pillars of national security (Army, Police, Special services, and Defence industry), a new fifth civil protection pillar with an autonomous budget and responsibilities has to be established. The United States model is an indicative example of this approach, where the Federal Emergency Management Agency's main structure for ensuring civil protection in case of fires, disasters, accidents, catastrophes, and other emergencies has been drastically expanded to include additional tasks after the 9/11 terrorist attacks [4–6]. The situation is similar to that of the Ministry of the Russian Federation for civil defense, emergency situations, and the elimination of the consequences of natural disasters. The other option points out that the civil protection responsibilities have been taken over by the four security pillars, which are developing certain additional capabilities. Eastern European organizational models generally look like that, where fire and rescue services are mainly part of the Ministries of Interior and the Ministries of Defense have responsibilities for dealing with the consequences of major building fires in certain cases. In some Central European countries, like Austria, for example, the professional fire department is financially supported by the respective municipality, while the other fire departments are voluntary units.

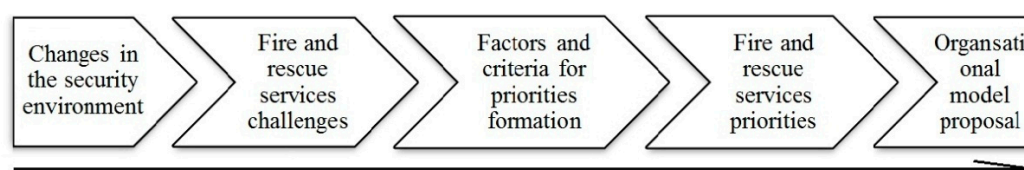
Therefore, three common models for fire and rescue services in most countries appear. The first includes the countries where the main responsibilities of ensuring fire safety and civil protection are concentrated within the Ministry of Interior at the central level and at the regional level—by its territorial divisions. This model uses not only the fire and rescue teams but also the police and health services in case of fires, accidents, and disasters. The second model is employed in countries in which the responsibilities are operated mainly by the Ministry of Defense. At the regional level, they are supported in their activities by their regional divisions and municipal authorities. The participation of volunteers and non-governmental organizations is partial. The Ministry of the Interior or the Ministry of Defense, respectively, is responsible for organizing and implementing comprehensive civil protection strategies. They have control and coordination between their units and any other participants in actions to prevent fires, disasters, accidents, and terrorist attacks and eliminate their consequences. The third model shows that the responsibilities at the central level are managed and coordinated by the State Agency under the leadership of the Council of Ministers in cooperation with various government bodies or state agencies at national and regional levels. The financing procedures of all three models are generally carried out entirely at the expense of the national budget. Some interesting approaches for reconfiguration are reported in the literature, e.g., the changing of the Rotterdam-Rijnmond regional fire service in the Netherlands with a multi-dimensional approach [7] and an in-depth case study for reconfiguration in Nottinghamshire, the United Kingdom, using participant observation, document analysis, interviews with key stakeholders, and the response to a public consultation exercise [8]. Usually, the organizational structure of the fire and rescue services represents a linear-functional structure in terms of management theory [9,10], which is most often used by the authorities.

The research question of this study can be formulated as: “How can fire and rescue services in Bulgaria enhance their adaptability and effectiveness for better responding to post-flashover building fires, with a specific focus on the integration of advanced techniques, equipment, and collaboration with building management?” The aim is to highlight a fire and rescue services reconfiguration model based on identified changes, challenges, factors, criteria, and priorities based on an in-depth survey conducted in Bulgaria as a case study.

The findings for the changes, challenges, and priorities can be applicable to other contexts in similar conditions, not only to the Bulgarian response.

## 2. Materials and Methods

The methodology of the research follows the chain flow shown in Figure 1. After specific changes concerning fire and rescue services summarization, the challenges are defined, separating them as objective and subjective. Specific factors and criteria are clarified, which will be the ways to summarize the fire and rescue services priorities. After a short presentation of the current Bulgarian fire and rescue services model, the final action will be to propose an organizational model for fire and rescue services in Bulgaria based on the identified priorities.



**Figure 1.** Methodology.

The key source of empirical information is a survey [11]. Through this method, the opinions of employees in managerial positions from all regional directorates for fire and rescue services in Bulgaria were scrutinized. The survey is essentially a stratified professional sample of positions, as the reason for this choice is the topic itself, which refers to the strategic opinions and decisions of employees with experience in managerial positions. Direct anonymous hard-copy survey cards were used, which, after being filled out, each surveyed employee placed and personally sealed in an individual envelope attached to it, which was a prerequisite for complete anonymity, freedom, and sincerity of the answers. The coverage of the survey was as follows: (1) Temporal—up to 2019; (2) Territorial—all 28 regions in Bulgaria; and (3) Quantitative—280 survey cards in total; 10 per each of the 28 regions of the country; respectively. After a thorough initial review of the completed survey cards, it was found that 13 of them were not filled out and were cancelled, which is 4.6% of the total number of survey cards. Therefore, in the conducted research, 267 employees in managerial positions were surveyed, and the survey cards valid for processing analysis were 267. The statistical analysis software IBM SPSS Statistics, Version 19 [12] was used to process the survey results [13]. From the indicators in Table 1, it can be concluded that the surveyed employees have ample experience in their areas of responsibility, which is a merit for the present study and the obtained results. A Ferdov and Dospevski guideline about the theory and technology of empirical sociological research at the Ministry of Interior of Bulgaria was used for the proper conduct of the survey and analysis of the results. A one-dimensional distribution of the results is used in the research.

From the indicators in Table 1, the sample made by years of work experience of the surveyed employees shows that 52% (or 141 employees) have more than 21 years, 39% (or 103 employees) have from 11 to 20 years, and the remaining employees have up to 10 years, inclusive. Also, regarding their activities, 52% (or 136 employees) indicated that they worked in both operational and preventive directions. From these indicators, it can be concluded that the surveyed employees have a lot of experience in their fields of activity, which is a good basis and gives weight to the results obtained, which is a prerequisite for an objective interpretation of the obtained values.

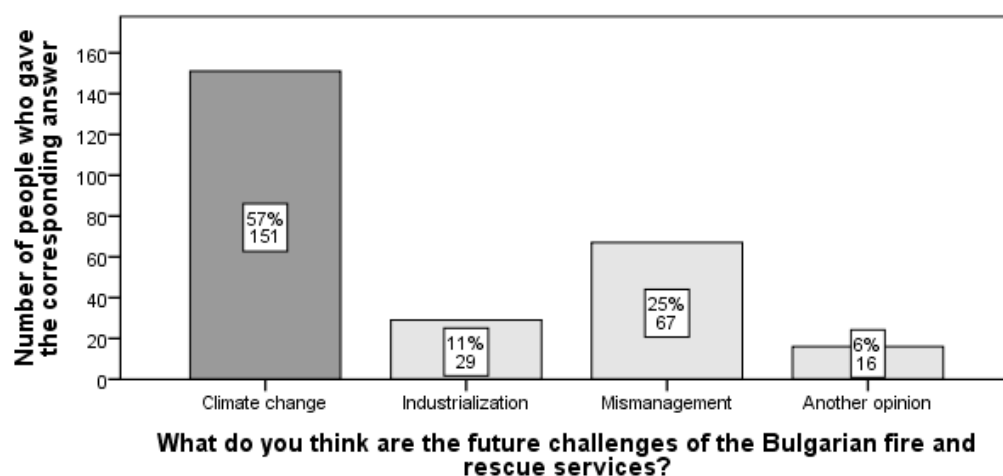
**Table 1.** Information about the participants in the survey.

	Working Experience of the Participants				Total per Area of Responsibility
	Up to 5 Years	6–10 Years	11–20 Years	More than 21 Years	
Operational work	1	9	30	32	72
Prevention work	1	8	28	22	59
Both	0	4	45	87	136
<b>Total per working experience</b>	<b>2</b>	<b>21</b>	<b>103</b>	<b>141</b>	<b>TOTAL 267</b>

### 3. Results

The **changes** concerning the efficiency and effectiveness of the fire and rescue services for better dealing with post-flashover building fires are identified as: (1) technological progress: the use of technologies indisputably improves the efficiency of fire and rescue services, but at the same time makes them more vulnerable, as they increasingly depend on various technological solutions that are not entirely under the direct control of their users (from simple failures of purely technical systems to major cyber-attacks). Developing and implementing new technological solutions for fire safety is and will continue to be a challenge for fire safety engineers, who shall have to combine the technical solutions with effective fire safety management [14], especially in dealing with post-flashover big building fires in modern dense urban landscapes; (2) socio-economic environment: while some countries have experienced rapid population increases in recent decades, other countries, mainly in Europe, have the opposite problem of aging and a declining birth rate [15,16]. With an aging population, the likelihood of fires and victims of home fires increases. The trend of age distribution of fire deaths shows that the number of elderly people killed in fires is the highest as they are less able to leave the area of the fire due to limited mobility; and (3) public opinion and social participation: different polls show that the firefighting profession is the most trusted in society in many countries and the world’s leading arithmetic leader [17]. Bulgarian society has also, for years, considered the fire and rescue services to be very reliable. Maintaining this trust is an important activity for achieving the goals of the structure.

Concerning the **challenges** presented in Figure 2, the surveyed employees gave a high priority to Climate change (57%), followed by Mismanagement (25%), and Industrialization (11%).



**Figure 2.** Bulgarian fire and rescue services future challenges survey chart.

Undoubtedly, a very big challenge for fire and rescue services worldwide is climate change and subsequent disasters [18–20]. According to a UN report [21], economic losses

from disasters (fires, earthquakes, tsunamis, cyclones, and floods) reach “an average of \$250 billion to \$300 billion each year. “These are the necessary financial resources that countries need to set aside each year to ensure their recovery from impending disasters. The report also states that “global climate change is already affecting levels of danger, increasing the risk of disasters.” However, the effects of climate change are not evenly distributed, as a result of which individual countries are affected in different ways and intensities. It is necessary for all countries to make efforts to create preventive mechanisms for new risks, reduce existing ones, and manage them effectively in order to ensure sustainable economic and social development. In addition to the mismanagement, the following subjective challenges need to be noted as well: As a general rule, societies have considered fire and rescue services to be very reliable, as already mentioned before. Maintaining this trust is an important part and a great challenge for the work and motivation of employees, as it is built over a long period of time by providing quality and timely intervention in case of any dangers to the population. The reduction of the population outside the big cities (mainly in Europe) [22] has a direct impact on the small fire brigades, as the minimum number of employees on duty is reduced, the costs for maintenance of fire and rescue equipment can be reduced to a minimum, and in the worst case, fire brigades can be closed down. A possible solution to the problem is increasing the number of voluntary bodies and creating fully autonomous voluntary fire services. At the same time, recruiting volunteers is a major challenge for the shrinking and aging population in some areas. Recruiting volunteers is also hampered by individualism in society. A major challenge is the significant increase in awareness-raising activities to improve the fire culture of the population and reduce the number of people killed and injured in building fires. Like other organizations, fire and rescue services also face the challenge of thinking about and proposing options on how to effectively use the development of interactive communication and the growing use of smart devices to achieve their goals for better fire safety in urban environments. Increasing the readiness and training of fire fighters and volunteers to deal with building fires and emergencies is always a major challenge. The best solution is to build large training centres for firefighters and volunteers to practice various techniques in close proximity to the real environment.

The **factors** shall be understood as a set of objective circumstances and subjective efforts, which will be the basics, turned into tools for forming and deriving priorities for fire and rescue services for better dealing with post-flashover building fires. Considering the above multi-dimensional positions, the factors are summarized as: (1) Objective factors (circumstances)—e.g.; climate change; industrialization; technological progress; (2) Subjective—international factors (opportunities)—ideas from perspective fire and rescue services models in foreign countries; and (3) Subjective—national factors (opportunities)—opinions and recommendations of employees from the fire and rescue services in the Republic of Bulgaria expressed in the survey and personal authors perspective. The criteria shall be understood as well-defined conditions, supported by theory and experience, for creating the new organizational model proposal. The criteria are: (1) Scientific—application of derived statements from the changes in the safety environment; (2) Foreign—incorporating through an appropriate way of working practices from the foreign models; (3) National—survey results; and (4) Personal vision—personal ideas; opinions; and views of the authors. Objective circumstances, subjective efforts, and derived criteria form a complex set of ideas that is difficult to comprehend and even more difficult to derive the right priorities in the presence of many interests, conservatism, and the desire for quick decisions. In this way, an organizational model can be formed that either follows or anticipates objective needs. The result is often the creation of systems that diverge from events and can lead to mass discontent, national security problems, and sharp political twists. However, in this study, workable solutions are proposed that take into account and combine the above factors and criteria, forming priorities that provide an opportunity to discuss an organizational model for fire and rescue services as a State Agency.

Concerning the **priorities** presented in Figure 3, the corresponding survey question required an indication of three priorities that the participant considered the most appropriate. They are identified as: Increasing the motivation of employees (73%); Better professional training of employees (68%); Changes in legislation (56%); Better technical provision (49%); and Better material provision of employees (19%). Additional priorities identified are: Prevention; International cooperation; Voluntary formations. From the results obtained, it can be concluded that clearly expressed stand-out priorities are not observed; therefore, all shall be considered.

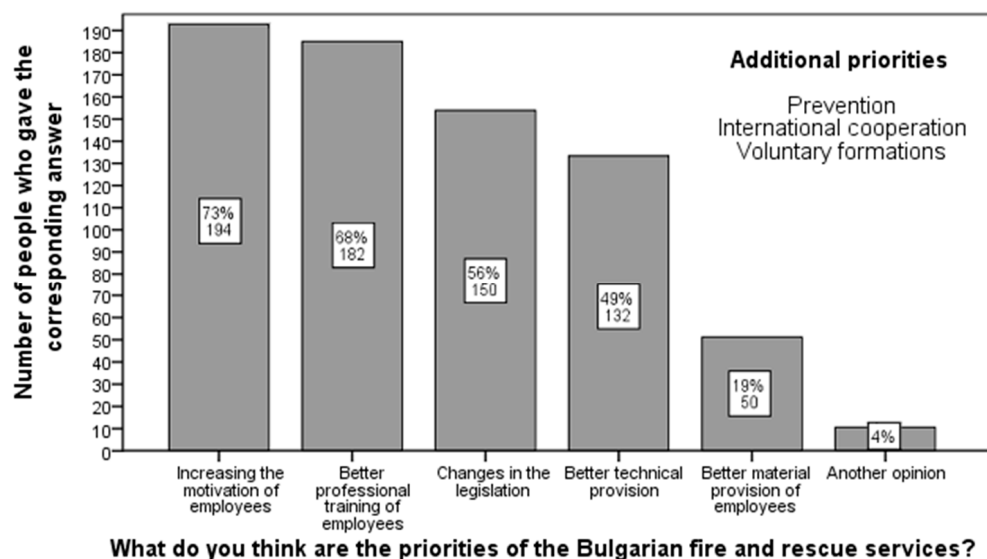


Figure 3. Bulgarian fire and rescue services priorities survey chart.

## 4. Discussion

### 4.1. Current Fire and Rescue Services Organizational Model in Bulgaria

Fire and rescue services in Bulgaria are part of the Ministry of Interior as an important part of the security system. According to the legislation, it is a national specialized structure for the practical implementation of activities according to the Ministry of Interior Act and the Disaster Protection Act. These activities are: prevention; state fire control; fire and rescue activity; urgent emergency restoration works; operational flood rescue and protection; search and rescue operations; chemical, biological, and radiation protection; early warning and disclosure in disasters; conformity assessment and control activity of fire extinguishing products; determination of fire characteristics of products and the technical and operational indicators of fire-technical equipment and fire-extinguishing products; licensing and control activity of traders performing activities to ensure fire safety. Preventive activity is widely advocated in the current model. It includes: informing the public, including through editorial and publishing activity, about the dangers and risks of fires, disasters, and emergency situations; supporting the training and practical training of the central and territorial bodies of the executive power, the response forces, and the population; supporting training on disaster protection in the pre-school and school education systems and in the higher education system; assisting disaster risk reduction councils at the national, regional, and municipal levels in performing their functions according to the Disaster Protection Law; and assisting disaster protection planning. The training of employees for the needs of fire and rescue services is carried out at the Academy of the Ministry of Interior. The administrative management system is a hierarchically built, subordinate structure, leading and supporting its structural units in the process of organization and realization of the subject of the activities. For the implementation of the main functions, there are two directorates: the state control and preventive activities directorate and the operational activities directorate, as well as administrative and other lower-ranking units. The territorial units are the Sofia (Capital) directorate, 27 Regional

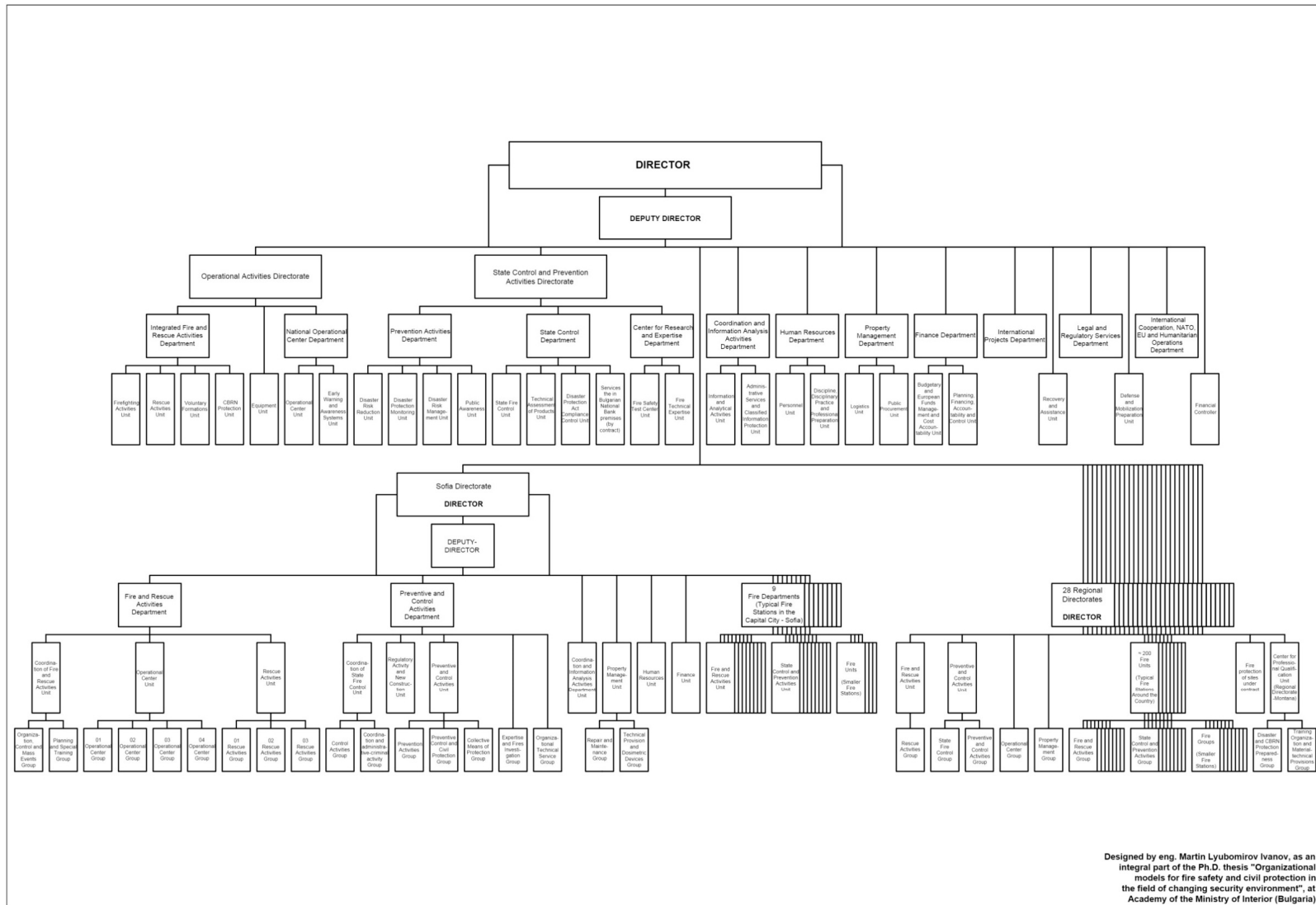
directorates around the country, 212 local fire brigades, and other units of lower rank. At the present moment, the fire and rescue services have 8524 permanent professional staff. The total number of accidents received and worked out for 2022 is 62,492, which is an average of 171 calls per day. The number of people killed in fires in the whole country for 2022 is 156, and the number of people injured in fires is 290 [23]. The number of people killed by fire per 100,000 inhabitants in Bulgaria is therefore estimated at 2.2, which is significantly higher compared to other European countries, e.g., Finland (0.5), Hungary (0.4), Denmark (0.6), etc. [11].

Voluntary formations are also created on a territorial basis to support the main components of fire and rescue services, performing the following basic activities for the protection of the population: rescue operations; containment and extinguishing of fires; search and rescue operations; performing urgent emergency restoration works; providing first aid to victims of fires, disasters, and emergency situations; and other security-related operations. Volunteers are recruited by the mayor of the respective municipality. The volunteer units mainly carry out their activities in support of the local professional services as an additional team to deal with a given emergency situation (e.g., a large forest fire). There are no established autonomous volunteer services with fire trucks. At the present moment, there are 245 voluntary units in all regions of the country with 3261 volunteers [23].

A scheme of the organizational structure of the current fire and rescue services organizational model in Bulgaria as a General Directorate in the Ministry of Interior is presented in Figure 4 [11,23].

The survey results show that 51% (136 pp.) of the employees recognize the importance of fire and rescue services as an important part of the security system, 60% (161 pp.) think that the organizational structure is overloaded in the current model, and 64% (171 pp.) believe that the place of fire and rescue services should be as a State Agency under the leadership of the Council of Ministers, regulated by a separate Fire and Rescue Services Act, chosen by 76% (204 pp.). It is observed that the surveyed employees opine that a reconfiguration of the fire and rescue services is needed. Figures 5–8 show the survey results in detail.





Designed by eng. Martin Lyubomirov Ivanov, as an integral part of the Ph.D. thesis "Organizational models for fire safety and civil protection in the field of changing security environment", at Academy of the Ministry of Interior (Bulgaria)

Figure 4. Current fire and rescue services organizational model in Bulgaria [11,23].

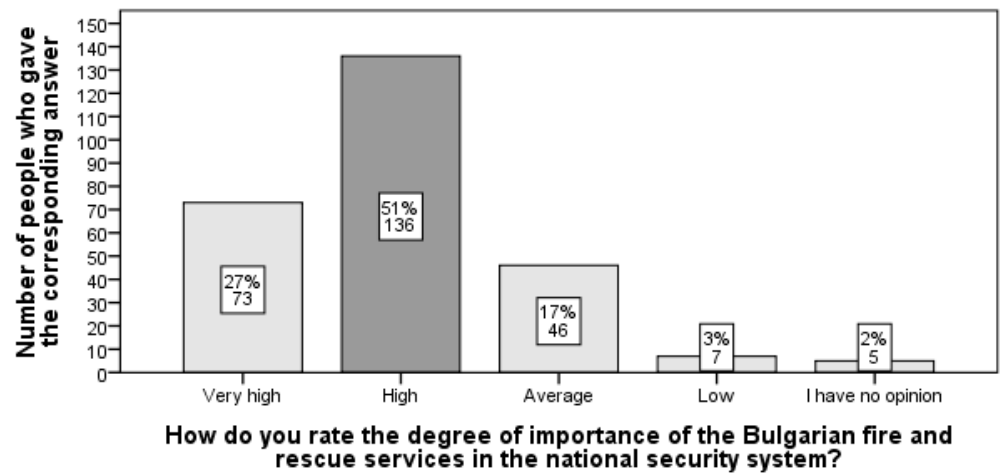


Figure 5. Bulgarian fire and rescue services degree of importance in the national security system survey chart.

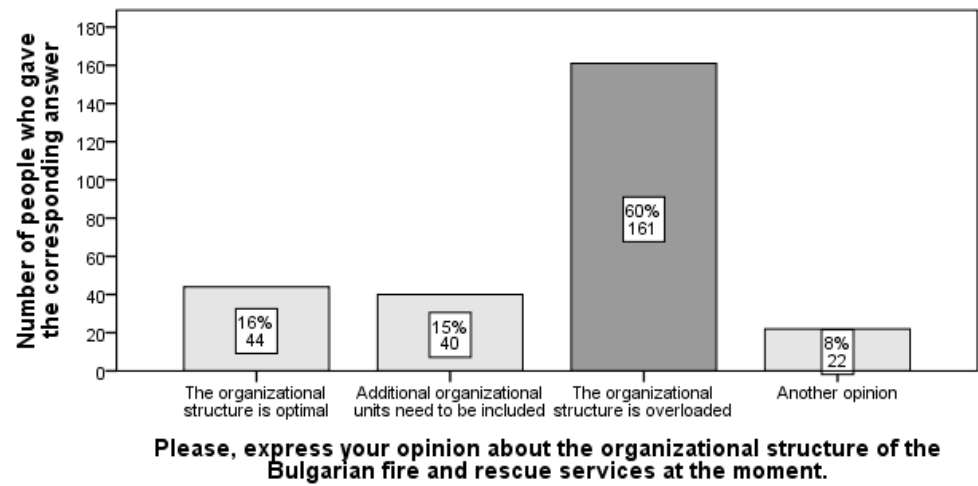


Figure 6. Opinion on organizational structure of the Bulgarian fire and rescue services survey chart.

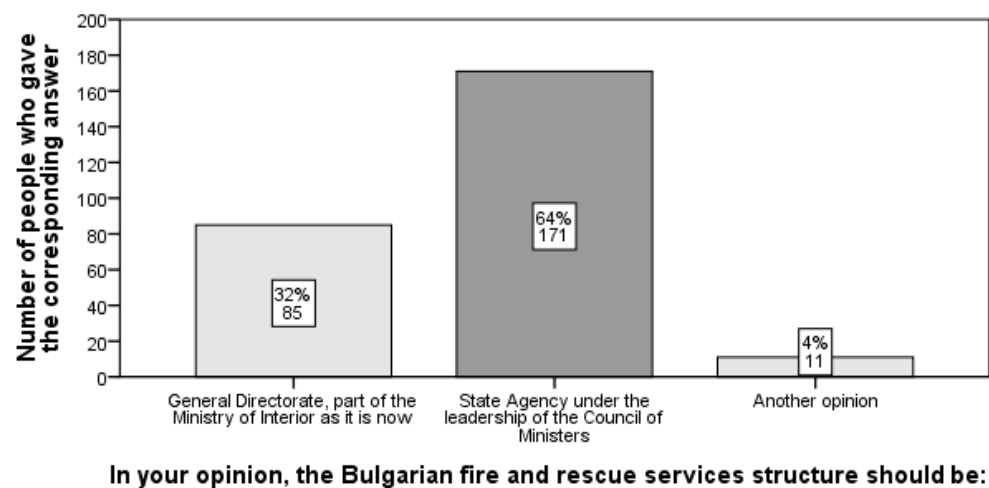
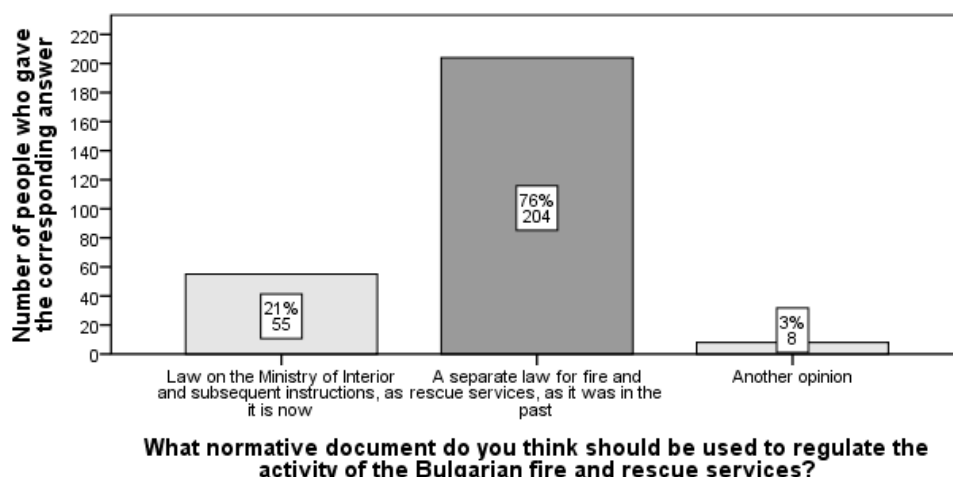


Figure 7. Opinion on the place of the Bulgarian fire and rescue services survey chart.



**Figure 8.** Opinion on the normative document for regulation of the Bulgarian fire and rescue services survey chart.

#### 4.2. Proposed Fire and Rescue Services Organizational Model

This new organizational model proposed by the authors aims at enhancing the efficiency and effectiveness of the Bulgarian fire and rescue services for better dealing with post-flashover building fires. For a better illustration and description of the proposed organizational model, a universal scheme with **eight elements** will be used for presenting systems of any nature [24], respectively, transformed for the purpose of the current research. The scheme is presented in Figure 9.



**Figure 9.** General scheme of the proposed organizational model.

The first step is to take into account the external environment, identifying the purpose, strategy, subject, and object of management—in other words; what needs to be conducted. The second step is to propose the elements of the internal environment that satisfy the strategic vision and direction of the system, or how to deal with the necessary organizational structure, values, legal framework, and resources.

The model’s **purpose** is to provide an up-to-date and reliable approach to providing effective and timely fire safety activities for better dealing with post-flashover building fires.

A comprehensive **strategy** for fire safety and civil protection is needed. The fire safety part should be strengthened with strategic goals such as: increasing preventive activity among the population in order to reduce the number of people killed and injured in fires;

investing in the construction of a large training center for firefighters and volunteers; introducing policies for better technical maintenance of fire equipment; increasing international cooperation; and having well-prepared and motivated voluntary bodies.

The **subject of management** is the institution that realizes the purpose, which is proposed to be the State Agency under the leadership of the Council of Ministers.

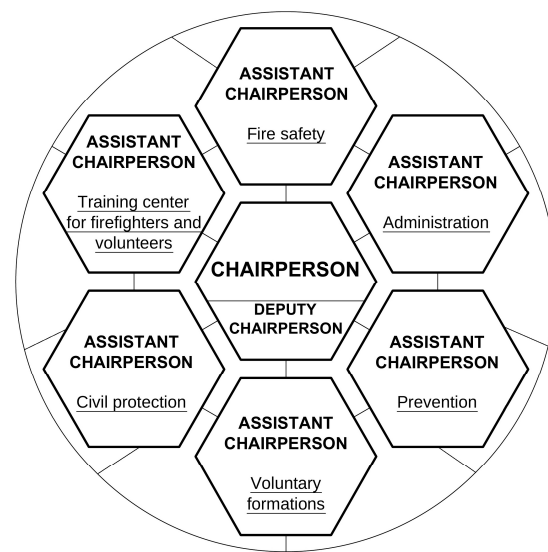
The **objects of management** are the challenges, risks, dangers, and threats that affect the population in post-flashover building fires.

The proposed **organizational structure** of fire and rescue services shall be analyzed along three dimensions: vertical, horizontal, and spatial differentiation [25,26]. The organizational structure of the proposed model is a hierarchical-network hybrid, as it is hierarchical in the implementation of management functions and network in the implementation of operational activities in professional and voluntary aspects. The topic of network structures within government institutions is a subject of widespread global discussion. Given that networks are predominantly associated with successful private international corporations, the question of whether a state institution within the security system can adopt a purely network organizational structure raises numerous uncertainties. The response to this question tends to be negative, as the fundamental differences in the concepts of security between the public and private sectors come into play. This disparity can be attributed to the fact that state institutions responsible for security, healthcare, education, and public order primarily pursue idealistic goals, whereas private businesses are primarily profit-oriented. In general, hierarchical structures tend to be resource-driven and operate reactively in response to specific challenges, risks, hazards, and threats. On the other hand, network structures are typically oriented towards goals, proactively anticipating and working to prevent challenges, risks, dangers, and threats, with the resources to neutralize them should they arise. This is why the proposed structure is a combination of hierarchical and network models. It follows a hierarchical approach in the execution of management functions while embracing a network approach in the implementation of operational activities, encompassing both professional and voluntary components. In this model, two fundamental principles of network structures are incorporated. They are shrinking the structure vertically [27] and protecting the hubs [28]. The first principle of striving for a minimum number of members and levels in the organization and a fast, unhindered flow of information in both directions is very important, which means that it must be as flat as possible because each layer doubles the noise and halves the message [29]. The second principle for hub protection in this kind of structure is more easily achievable with the interchangeability and mutual assistance of coordinators, where most connections enter. The organizational structure is divided into three levels: national headquarters, regional structures, and municipal structures. The management is presented in Figure 10.

The State Agency is led by a chairperson, supported by a deputy chairperson, and six assistant chairpersons. The six assistant chairpersons head the six main key elements in the structure: (1) Fire safety; (2) Administration; (3) Prevention; (4) Voluntary formations; (5) Civil protection; and (6) a Training center for firefighters and volunteers. The six chairpersons are networked and have complete information about the whole service, with information flowing in all directions. In support of their activities, the six chairpersons manage coordinators in specific areas. The assistant chairperson for fire safety leads two coordinators, respectively, the coordinator for operational activities and the coordinator for fire safety control, which is the main effort for enhancing the efficiency and effectiveness of the fire and rescue services for better dealing with post-flashover building fires. So far, the organizational structure is hierarchical. The coordinators, on the other hand, are already in a partly networked structure with various operational elements at the national level that regulate and control the activities of the whole structure. At the regional level, fire and rescue services are managed by district coordinators, which manage five structural units: fire safety, administration, prevention, voluntary formations, and civil protection. The capital district is an exception, with more units. At the operational municipal level, the activity is organized by fire brigades and voluntary bodies. Here the structure becomes

fully networked, connecting the professional staff of the State Agency with the voluntary bodies. The key elements in the model are organized as follows: (1) Prevention: preventive activity is a main focus of the entire organization as one of the six main key elements at the national level. It is widely represented at all levels of management. The main goal is a broad explanatory and training campaign for the population in all age groups on preventive and corrective actions in case of post-flashover building fires, with the main goal of reducing the number of dead and injured citizens. In this regard, it is proposed in the new model that it is necessary to establish structural units for prevention both at the national and regional level with staff to carry them out among the population—with children as well as with people of active and retirement age. Also of great interest among all children of all ages is the work of firefighters. It is necessary to use this interest and conduct many more seminars in kindergartens and schools on established curricula. In addition, young people (older than 15 years) can already be involved in the fire department with some kind of auxiliary service. It is also necessary to carry out these activities on private properties, where it is not so common to have strict control over the fire requirements and where the largest number of people are killed and injured in fires. A working solution from Estonia is the use of autonomous (battery-powered) smoke detectors to signal a fire [14], which is a good option for achieving this goal. It is needed to perform broad, explanatory campaigns in the media to prevent fires and take proper action in case of post-flashover building fires; (2) the training center for firefighters and volunteers is also a major focus of the entire organization as one of the six main key elements at the national level. Its creation is necessary because it is lacking now, which is a mandatory and vital condition for combining theory and practical training. It is necessary to create multiple and different training grounds and simulators, as close as possible to the real environment where practical issues can be performed; (3) better maintenance of the fire equipment is emphasized at all levels of the organization. It is necessary to have structural units for "maintenance and repair of fire equipment" with expertise and sufficient practical experience to monitor the timing of operations and to organize this activity at both the national and regional levels. According to the operating instructions of the manufacturers, the use of fire equipment must be the main priority and responsibility of the firefighters in the operational shifts, as it is the only means of ensuring quality performance and maintaining population confidence. It is necessary to provide reliable personal protective equipment for all employees, with a constant supply of new ones for timely replacement of personal protective equipment after its expiration date. Providing smart devices for navigation and object learning for fire engines is also needed, as is reducing the bureaucratic burden on state fire control and preventive activity employees by digitizing the activity and tying it up with other state bodies. (4) International cooperation is an important part of the model. This activity is placed in the administrative part, as, in addition to an International Cooperation and International Projects Unit, a separate Analysis of International Experience and Good Practices Unit shall be set. The main activity shall be the research and analysis of materials, strategies, articles, studies, innovative solutions, full-scale experiments, contacts with foreign fire and rescue services and universities with such specialties, and conducting trainings, internships, and specializations of employees abroad. It should be noted here that purely mechanical copying of models, practices, ideas, or parts of them usually does not lead to the desired results due to the fact that different countries differ significantly for a number of reasons—climatic, historical, cultural, value, moral, and many others; (5) voluntary formations: The organization of voluntary bodies better fits within the competences of the fire and rescue services, not of the municipalities' mayors, as it is at the moment in Bulgaria. It is also a main focus of the entire organization in the model as one of the six main elements at the national level and similar structures at the regional and municipal level. Effective regulations, organization, material, and fiscal stimulation of voluntary bodies are necessary for the performance of both operational tasks (either in autonomous fire services or in joint duties in professional fire stations), as well as inclusion in an explanatory and training campaign for the population of all ages on prevention

and correct appropriate actions in case of post-flashover building fires. A scheme of the proposed fire and rescue services organizational model is shown in Figure 11.



**Figure 10.** Management of the proposed fire and rescue services organizational model.

The **values** of the State Agency are related to the culture, memory, traditions, and customs of the local population.

The **legal framework** should be the Fire and Rescue Services Act. Concerning the **resources**, the new structure should have its own budget, sufficient for higher remuneration of the employees, efficient and timely servicing of the fire equipment, reliable personal protective equipment with their timely replacement at the expiry date determined by the manufacturers, and good conditions in the fire brigades.

A table for comparison of differences with the current model and a table with the strengths and weaknesses of the proposed fire and rescue services organizational model are summarized in Tables 2 and 3, respectively.

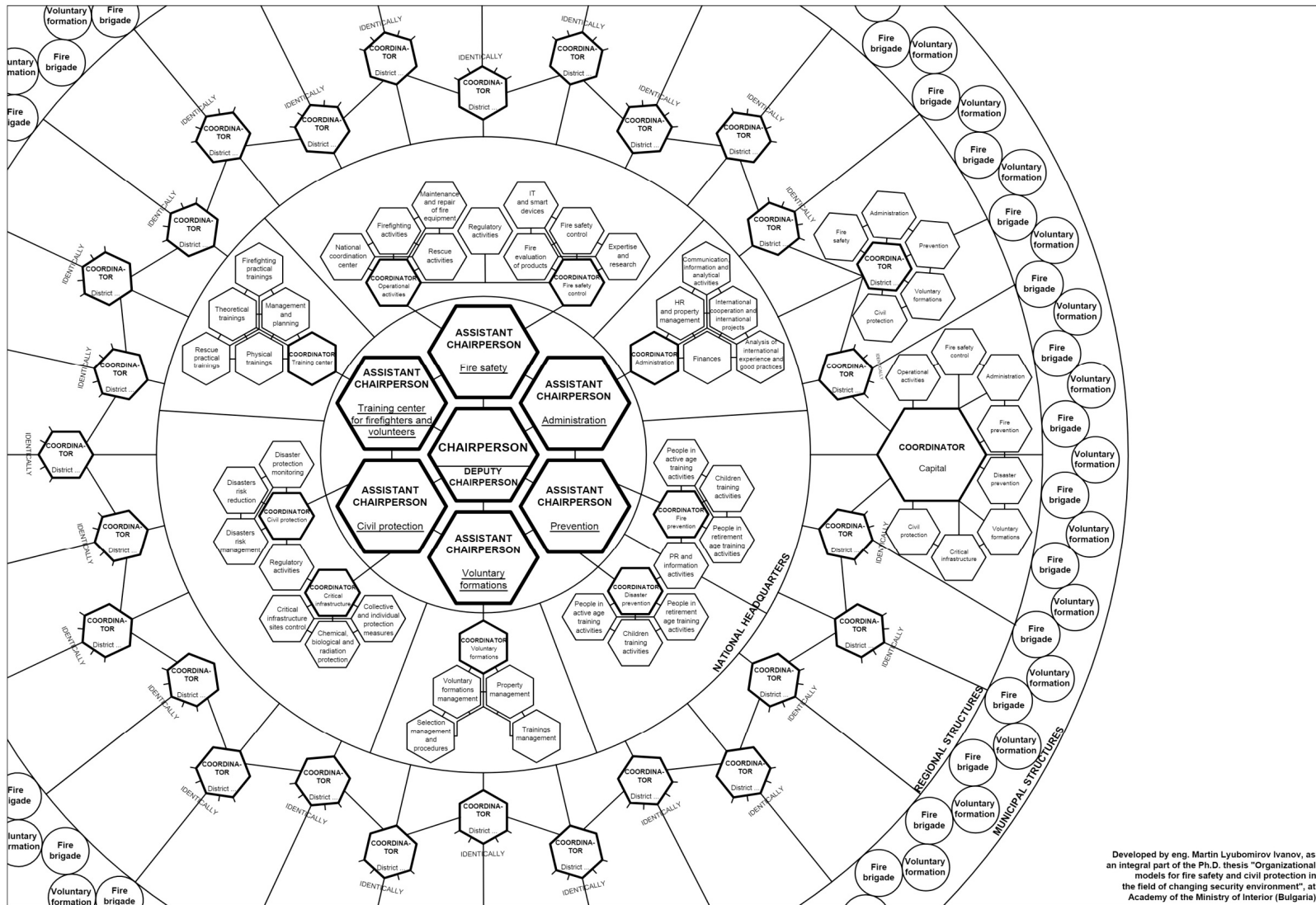


Figure 11. Proposed fire and rescue services organizational model.

**Table 2.** Comparison table.

	<b>Current Fire and Rescue Services Organizational Model in Bulgaria (Figure 4)</b>	<b>Proposed Fire and Rescue Services Organizational Model (Figure 11)</b>
Subject of management	General Directorate in the Ministry of Interior	State Agency under the leadership of the Council of Ministers
Organizational structure	Hierarchical	Hierarchical-network
Legal framework	Ministry of the Interior Act and Disaster Protection Act	(New) Fire and rescue services Act
Comprehensive strategy for fire safety and civil protection	No (only for civil protection exists)	Yes
Manager	Director	Chairperson
Deputy Managers	2 Deputy Directors	1 Deputy Chairperson
Assistant Managers	No	6 Assistant Chairpersons
Main national level management bodies	Two directorates: (1) the State control and preventive activities directorate, and (2) the Operational activities directorate	Six key elements: (1) Fire safety, (2) Administration, (3) Prevention, (4) Voluntary formations, (5) Civil protection, and (6) Training centre for firefighters and volunteers
Main regional level management bodies	Sofia (Capital) directorate and 27 Regional directorates	28 district coordinators
Voluntary formations under the organizational model	Not effective (now they are under the Mayor’s jurisdiction)	Yes
Training centre for firefighters and volunteers under the organizational model	No (currently, it is mainly part of the Academy of the Ministry of Interior)	Yes
Number of personnel	---	(–) Reduced personnel
Budget	---	(+) Increased financial resource
Age limit for participation in operational activities	No	Yes (proposed 45 years)
Focus points in the proposed model for enhancing the efficiency and effectiveness of the Bulgarian fire and rescue services for better dealing with post-flashover building fires		Prevention
		Training centre for firefighters and volunteers
		Better maintenance of fire trucks and fire equipment
		Voluntary formations
		International cooperation

**Table 3.** Strengths and weaknesses of the proposed fire and rescue services organizational model.

<b>Strengths</b>	<b>Weaknesses</b>
Regulation of the activity is through the Fire and Rescue Services Act	Changing the current system with the proposed model should be smooth and transitional, increasing the requirements gradually and giving the current employees time and the right to make their choice to stay or not in the new structure. This is hard to achieve
The organizational structure is optimized	Significant stress to the employees in the beginning phases
Radical change and major development on key priority elements are expected	Reassignment or termination of employment of employees who cannot pass the increased physical and professional training tests, the result of which will give these employees a negative attitude toward the new structure
Higher remuneration	Additional financial resource
Reduced human resource	
Reduced administrative burden	

**5. Conclusions**

The living environment in urban areas is changing faster than ever. The proposed organizational model represents a significant step forward in bolstering the efficiency and



effectiveness of the Bulgarian fire and rescue services, particularly in addressing post-flashover building fires. The primary objective of this model is to offer a contemporary and reliable approach to addressing post-flashover building fires efficiently and promptly. It hinges on a comprehensive strategy encompassing fire safety and civil protection, with a particular emphasis on prevention, training, equipment maintenance, international collaboration, and voluntary formations.

The key takeaways from this research and the proposed organizational model are:

- **Comprehensive Strategy:** The model emphasizes the importance of a comprehensive strategy for fire safety and civil protection, with a particular focus on preventive measures, training facilities, equipment maintenance, international collaboration, and voluntary formations.
- **Management Structure:** The management structure centers on the State Agency, with a hierarchical approach to execute management functions, ensuring coordinated operations across different levels of the organization.
- **Hybrid Hierarchy-Network Model:** This innovative model combines elements of hierarchical and network structures, enabling efficient communication, adaptability, and a more streamlined approach to managing operations.
- **Operational Levels:** The proposed changes span across national, regional, and municipal levels, reshaping the organizational structure to enhance effectiveness and adaptability.
- **Value of Cultural Traditions:** The proposed model values local cultural traditions and customs, which can play a crucial role in community engagement and disaster preparedness.
- **Legal Framework and Resources:** The model is anchored in a robust legal framework, specifically the Fire and Rescue Services Act, and it calls for an independent budget to ensure higher employee remuneration, well-maintained equipment, and better working conditions within fire brigades.
- **Strengths and Weaknesses Analysis:** A comprehensive analysis highlights the strengths and potential areas of improvement of the proposed model in comparison to the current model.

In conclusion, we believe the proposed fire and rescue services reconfiguration model will improve the whole structure, including better dealing with post-flashover building fires.

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