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## To Manage Societal Security in COVID-19: Operational Continuity of Fire Rescue Service in Disaster Conditions

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Paweł Gromek<sup>1</sup>, Monika Wojakowska<sup>2</sup>

**Abstract:**

**Purpose:** The research objective is the question “How to manage societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service?”

**Design/Methodology/Approach:** In order to achieve the research objective, the qualitative method was used. The research materials were collected using the SWOT analysis. We involved 99 fire rescue experts in SWOT analysis to identify the continuity factors. Basing on 3731 elementary results, we unified them to the reference 40 (10 per each SWOT category). This gave us a background to formulate specific and general manners to ensure the security. The collected empirical data was processed using the methods of analysis, synthesis and comparison to form conclusions. Deductive and inductive inference methods enabled the presentation of a comprehensive approach to social safety management.

**Findings:** Specific methods relate to SWOT results, risk specifications and service conditions. Particular attention should be paid to physical isolation, organizational flexibility, personal protective equipment, training and access to up-to-date information on the outbreak. The research results can be used in scientific works, as well as in expert opinions for the needs of public administration units, in particular for the improvement of the management process of fire protection units.

**Practical Implications:** The study will positively influence the understanding of the needs of various participants in the safety management process, both in the current functioning of the organization and in crisis situations.

**Originality/ Value:** The study is an opportunity to present a comprehensive approach to managing social security in the face of COVID-19 and future epidemics. It covers risk management, operational continuity, and the safety and well-being of firefighters. To the best of the authors' knowledge, this is the first study to present such an approach.

**Keywords:** Rescue, disaster, epidemic, covid, fire, continuity.

**JEL codes:** H12, A12, M12.

**Paper type:** Research Paper.

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<sup>1</sup>Dsc. Eng., Associate Professor, The Main School of Fire Service in Warsaw, Poland, Institute of Internal Security, [pgromek@sgsp.edu.pl](mailto:pgromek@sgsp.edu.pl);

<sup>2</sup>PhD., The Main School of Fire Service in Warsaw, Poland, Institute of Internal Security, [mwojakowska@sgsp.edu.pl](mailto:mwojakowska@sgsp.edu.pl);

## **1. Introduction**

Disasters force societies to ensure their continuity due to statement of basic conditions for societal security. Just like fire rescue service which must be resilient to them itself. This generates serious challenges, especially in the face of COVID-19. Coronavirus disease, that occurred in 2019 (COVID-19), strongly changed a current perception of safety and security. The disease has been impacting nearly entire world for many mounts (Varotsos and Krapivin 2020; Rahman *et al.*, 2020). Use of multiple prediction models gives different and even precluding opinions when it will stop spreading (He *et al.*, 2020; Plank *et al.*, 2020; Karako *et al.*, 2020; Yang *et al.*, 2020). Consequently, nobody truly knows whether and when COVID-19 will precisely end as this hazard is dynamic and difficult to be credibly predicted (Ghosh *et al.*, 2020; Zeng *et al.*, 2020).

Pandemic situation put to the test crisis management bodies (governments and public administration) and emergency services around the world. Especially when first response bases on intuition and must face lack of information concerning a pathogen specification, transmission routes and mechanism as well as the hazard scale. Their close cooperation is highly required for practical implementation of strategic plans against COVID-19 and to ensure basic security conditions for people in the pandemic reality (Laufs and Waseem, 2020; Fan *et al.*, 2021). Notably when World Health Organization (WHO), national and local recommendations consider multi-directional response to slow down the transmission, to reduce the mortality, to prepare healthcare service and other essential public services to operate intensively in long period of time, and to communicate risks to public (WHO, 2020a; 2020b; 2020c; Fu *et al.*, 2020). One need to remember that some of the entities are preliminarily dedicated and prepared to epidemic response (with specialized personal protection equipment and training) but some of them not. The second groups is comprised by (i.a.) fire rescue service, police, communal guards and communal services, without which healthcare service and local society could simply collapse.

A special attention should be paid to fire rescue service. On the background of emergency entities, it operates against the widest spectrum of hazards in many countries. We can enumerate fires, floods, hurricanes, road accidents, industrial accidents, mudflows, environment contaminations and many more kinds of disasters which could occur regardless the pandemic (UNDRR, 2020). It could initiate cascading effect of the hazards development (Alexander, 2018). This is why pandemic increases risk related to natural and man-made hazards (Cardil and de-Miguel, 2020; Mizhari, 2020; Thomas *et al.*, 2020). Furthermore, it strongly exerts a pressure on real operational potential of the fire rescue service which protect people, property and environment under the exposure on biological factors. As fire rescue officers are not immune to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), just like nearly everybody, and healthcare service often requires their direct support (e.g., in medical rescue teams, in logistics, in decontamination),

pandemic can seriously influence on the service continuity and consequently double-increase a total level of societal security in affected community. At the highest level of generality, there appears a question to how to manage societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service. This constitutes a main objective of the research.

## 2. Literature Review

Theorists and practitioners around the world made a lot of effort to investigate COVID-19 origin, transmission mechanisms as well as effective prevention, protection and response measures (Haghani *et al.*, 2020; Chu *et al.*, 2020). To show a wide range of the effort, use of 'covid' attribute to explore the ScienceDirect® base gives more than 28,000 scientific papers published in 2020 and more than 26.000 published and to be published in 2021 and 2022. However, considering operational continuity of fire rescue service strongly limits these values. Use of 'covid AND fire rescue service' attribute gives 145 and 'covid AND fire rescue service AND continuity' attribute gives only 26 searching results. Revision of titles, abstracts and contents of these papers sheds a light into a currently collected knowledge in analyzed context.

In general, problematic aspects regarding operational continuity of fire rescue service in COVID-19 conditions are dealt with indirectly. First of all, pandemic determines circumstances in which fire rescue service operates and supports in ensuring widely understood safety. SARS-CoV-2 affects all people who stay in the danger zone, regardless of age, sex, descent or social status. Consequently, fire rescue service should be prepared to protect not only citizens but also foreigners who trapped because of pandemic restrictions (Sakurai and Adu-Gyamfi, 2020). This could generate serious language and cultural challenges for the service officers. Another issue concerns the need to operate under the multi-pressure of hazards which could lead to disasters (Leroy, 2020). It is observed in case of energy transition, when COVID-19 can implicate additional hazards and requires additional personal protection equipment (Kuzemko *et al.*, 2020) just like in traffic safety. Even if pandemic restrictions can decrease a total number of accidents, such kind of circumstances also requires additional protection and can increase work risk for fire rescue officers on roads (Saladie *et al.*, 2020). Then, upgrade of security policies, protocols and guidelines is often required, shaping new operational principles (Rao *et al.*, 2020).

Secondly, the literature review results confirm that fire rescue service is one of many entities involved in pandemic response. As pandemic is a kind of disaster, the prime role is played by public administration (crisis management bodies) and units of the healthcare system. The public administration often coordinates all operations conducted in terms of COVID-19 (Wing-Keung Chan, 2020; Cortez and Johnson, 2020). Fire rescue service is one of the coordinated entities. Just like police (Bates, 2020). The two services can support each other to more effective lockdowns, travel

bans, and social distancing rules. Similar scenarios of trainings could initiate a synergy effect in common disaster response (Rojek and Smith, 2007, Laufs and Waseem, 2020; Beerens *et al.*, 2020). The obvious pandemic co-operator to fire rescue service is healthcare service which states a core emergency foundation in pandemic and needs operational support from other emergency services, public administration etc., (Jouffroy *et al.*, 2020). It finds its justification in preparing emergency infrastructure to disasters (Ortiz-Barrios *et al.*, 2020) and fighting barriers in interorganizational disaster response (Berchtold *et al.*, 2020).

Thirdly, the circumstances and cooperation needs shape operational domain of fire rescue service involvement into pandemic response. It can support such risk reduction activities as risk governance, risk communication, risk assessment, data collection, collecting knowledge and skills as well as cooperation and partnership (Kumasaki and King, 2020). The risk communication issues are worth to be highlighted, because the service is often familiar with communication means and manners used in case of other kinds of hazards (e.g., floods) and can implement its infrastructure, human resources and experiences for pandemic response (Walkling and Haworth, 2020).

Moreover, it can play a significant role in people-centered early warning system, before, during and after disaster (Zhang *et al.*, 2020). Especially that the service is generally better prepared to disasters that may occur parallelly to pandemic (e.g., rainfalls, floods, mudslides) than other emergency services and can effectively assist in the communication processes (Sakurai and Adu-Gyamfi, 2020). Relevant equipment (e.g., emergency drones) can serve for multiple tasks, including raising awareness and warning people, disinfection, delivering medical kits and testing samples, localizing people etc., (Yaacoub *et al.*, 2020; Hentati and Fourari, 2020). High cooperation potential with police should be noticed (Laufs and Waseem, 2020). Just like with healthcare service, in the context of preliminary identification of infected people (Jouffroy *et al.*, 2020), important in epidemic risk reduction (Alcantara-Ayala *et al.*, 2020). Emergency sheltering can be supported by fire rescue service as well. Shelters identification, organization and protection exemplify potential areas of the support (Wei *et al.*, 2020).

However, more than a year after the COVID-19 has appeared worldwide, there are still missing concrete guidelines which can be formally implemented by fire rescue service to ensure its operational continuity, respecting safety of the officers and security of the fire rescue processes (Sahebjamnia *et al.*, 2015, Cardil and de-Miguel, 2020). Results of the literature review do not present any comprehensive means nor manners. This is why an expert knowledge and holistic approach are highly desired. It is worth to emphasize that the results indicate factors which should be taken into consideration to formulate means and manners to manage societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service. Some of the factors are perceived positively (e.g., cooperation possibilities, past experiences) and some of them negatively (multi-hazard

occurrence, systemic character of the risk, increase of work risk, additional tasks etc.). Fire rescue service can directly influence on them (e.g., cooperation rules and mechanisms, personal protection equipment) or not (natural hazards, infection risk, etc.). Consequently we involved fire rescue experts to implement a set of social research tools to identify operational strengths, weaknesses, opportunities and threats which we understand as factors determining fire rescue service continuity in pandemic conditions and to formulate means and manners to achieve the general purpose of the research.

### **3. Research Methodology**

#### **3.1 Study Population**

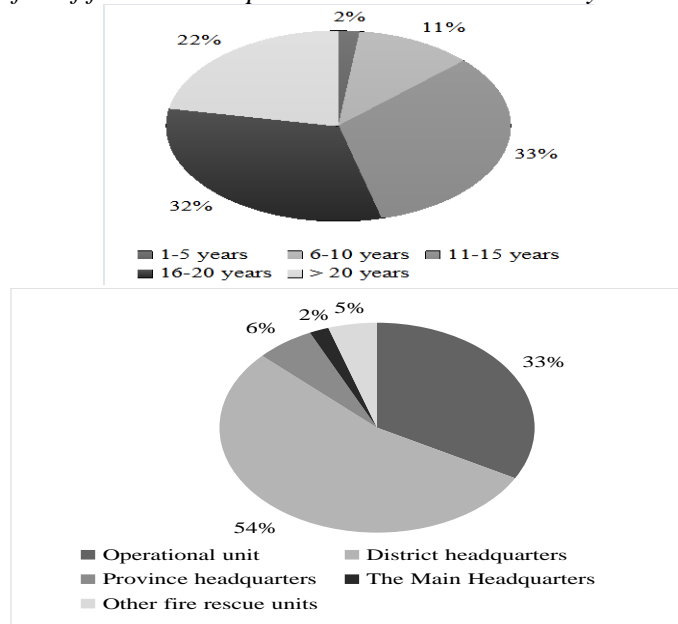
We involved to the research a group of experts (sample size  $n = 99$ ). The group was comprised by the state fire rescue officers who were taken part in a post graduate studies – vocational course preparing for emergency commanding posts (The Main School of Fire Service, May-June 2020). The research was carried out in May-June 2020. As we wanted to ensure the responders anonymization, information about them was limited to work experience and fire rescue units that they represented. This allowed us to maximize data credibility and thoroughness. Moreover, it was sufficient from the point of view of fire rescue service operational continuity – relevant attributes play a significant role in terms of human resources substitutability (different operational posts require also different officers' specification due to work experience and operational level), reflect experience and regard to multiple levels of fire rescue operations. The experts' profile is determined by work experience and represented fires rescue unit. Figure 1 presents the profile.

One third of the responders stay at the first line with hazards and fight them in COVID-19 conditions. This is very perspective from the bottom-up identification of the continuity factors. Just like in opposite way. The most of responders serve at the lowest management level (the district one) and meet practical problems with human resources, procurements and stability of the emergency system. They are complemented by officers from higher management levels, commonly constituting the top-down approach to SWOT analysis.

Moreover, most of them have exceeded '15-years long work experience' which means an early-retirement boundary in Poland and justifies that the responders gained operational experience and think prospectively about their future in the service. We state this as very positive from the results reliability point of view. Regardless work experience and fire rescue unit, all responders represent the State Fire Service which plays a primary, executory role in fire rescue in Poland (Gromek and Sobolewski, 2020). Such unique group of experts allowed us to holistically connect two closely related perspectives of fire rescue operations as the officers were gaining a knowledge and practical skills necessary for effective command

during emergency operations and were characterized by valuable, practical experiences in fire rescue operations.

**Figure 1.** Profile of fire rescue experts involved in SWOT analysis



*Source:* Own study.

### 3.2 SWOT Analysis

Authors prepared a survey template with 4 general questions to ask each of expert to formulate at least 7 (optimally 10) examples of factors which are the most important to manage societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service. To ensure their generality and comprehensiveness, we used SWOT analysis as a cognitive method to collect the information. Its diagnostic function allows to establish a specific balance between dependent and independent factors which determine the analysis object. Especially that it successfully finds its application in disaster management, resilience building and organizational continuity aspects during COVID-19 (Anjasni, 2013; Raza *et al.*, 2020; Li, 2020; Wang and Wang, 2020). So, each question in the survey template regarded to relevant SWOT element and referred to one of the following issues:

- strengths – which facilitate to ensure the fire rescue service continuity in COVID-19 conditions and are under influence of the service;
- weaknesses – which make difficult to ensure the fire rescue service continuity in COVID-19 conditions however are under influence of the service;

- opportunities – which facilitate to ensure the fire rescue service continuity in COVID-19 conditions and are independent form the service;
- threats – which make difficult to ensure the fire rescue service continuity in COVID-19 conditions and are independent form the service.

To operationalize and make responders easier to formulate particular kinds of factors, we made precise in the template that strengths and weaknesses could stem from the service specification, fire rescue officer ethos, resources (human, equipment, information and funds), internal procedures, operational codes, good practices, training system, previous experiences etc. In case of opportunities and threats, we added that they could have their source in formal enshrinement of the State Fire Service and the national fire rescue system, cooperation and support from other safety-related entities (public administration, other services, inspections and guards, media, armed forces, foreign entities, non-governmental organizations), relatively high social support for fire rescue officers, connection with multiple safety and security systems etc. The next step was to disseminate the template among the experts. We posted the template using MsTeams® platform dedicated for vocational course preparing for emergency commanding posts at the Main School of Fire Service. Each of expert had at least 2 weeks to download the template, to fill it and to sent it to the authors.

The presented approach stated frames to generate totally 3976 factors (99 responders x optimally 10 answers for each of 4 SWOT categories) which could help to holistically understand the continuity determinants. However, potentially maximum number of factors was in opposition to the results usability (too many elements to be considered in practice at the same time). So, we unified them to final number of 40 factors (per 10 to each SWOT category). The unification process based on meaning consolidation of strengths, weaknesses, opportunities and threats. Consequently, we used all experts' answers and formulated 40 representative ones which cover semantically the entire SWOT output (Patching et al., 2006, Bouma, 2006). The output served for formulation of means and manners to ensure the continuity in the face of COVID-19 and future epidemics in the light of societal security management.

#### **4. Findings and Discussion**

We got 100% surveys as a feedback from the experts. Involvement of them to SWOT analysis gave us 3731 elementary factors (nearly 94% of the optimal number) ascribed into particular SWOT categories. Even if we had asked the experts to formulate at least per 7 (and optimally 10) examples of strengths, weaknesses, opportunities and threats, some of them identified more or less answers. 967 strengths, 931 weaknesses, 924 opportunities and 909 threats were particularly formulated. Maximum and minimum numbers of answers were respectively 26 and 8 for strengths (median value was 10), 11 and 8 for weaknesses (median value was 10), 11 and 5 for opportunities (median values was 10) as well as 10 and 5 for

threats (median values was 9). Apart from general background of each SWOT category (shown in 3.2.), responders did not have any additional guidelines and tips to formulate the answers. Thus, they were forced to express their knowledge and experiences without influence of stressors and other kinds of determinants. The unification process allowed us to consolidate strengths, weaknesses, opportunities and threats to 40 representative ones (10 in each SWOT category). Table 1 shows the unification results.

**Table 1.** *Reference strengths, weaknesses, opportunities and threats for fire rescue service operational continuity in COVID-19 conditions*

SWOT category	References
Strengths	S1. Organization of 4-shifts system of service (officers in each shift are 24 hours on duty and then 24 hours at home; 2 shifts serve alternately in 2-weeks-long periods of time) which decreases a risk to freeze entire shift in case of COVID-19 affection S2. Possibility of remote work for officers in daily system of service S3. Limitations in stakeholders' service directly in the headquarter premises, possibility of documentation exchange via electronic post, teleconferences and videoconferences S4. Formalization of instructions, procedures and guidelines concerning COVID-19 sanitarian regime S5. Limitation of direct contacts between officers in daily system of service with officers at shifts and between the shifts; high level of self-discipline S6. Physical isolation of dispatchers from other fire rescue unit officers (at shifts) and officers in daily system of service S7. Access of dispatchers to actual list of people on quarantine, daily updated by state sanitary service or police S8. Reserves of disinfection means as well as equipment and personal protection equipment for officers participating in fire rescue actions S9. Implementation of on-line training system, transferring actual knowledge and guidelines about COVID-19 S10. High competences, flexibility and involvement of officers
Weaknesses	W1. Difficulties in keeping sanitarian regime (intervals and isolation) due to direct contact to victims and bystanders, supporting of healthcare service units and multiple ways to spending own time W2. Low level of the service posts in the context of abstentions, retiring, parental benefits, quarantines and sick leaves W3. Lack of funding sources in local headquarters for additional procurement of protection means and relatively high prices of the means W4. Extended decision processes, lack of competent officers, limited possibilities to substitute for absent officers W5. Withholding of recruitment for new officers W6. Low quality of contact with other public services W7. No trainings and exercises W8. Limited possibilities to prevention activities as well as engines and equipment service W9. No reserves and inadequate number of personal protection equipment W10. General overload of officers (many fire rescue actions, stress, psychophysical disorder)
Opportunities	O1. Changes in training system (on-line courses, also for voluntary fire services) O2. Remote work for officers in daily system of service O3. Responsible operation respecting COVID-19 regime O4. Collecting new knowledge about COVID-19 and social responsibility of officers and collecting new experiences O5. Thorough and confirmed information from media and sanitarian service about pandemic situation O6. Winning new funds and equipment from external entities (e.g. public administration and local entrepreneurs) O7. Increasing local headquarters' funds for necessary personal protection equipment, increasing access to disinfection means O8. Limitation to minimum of physical contacts with officers



SWOT category	References
	O9. Cooperation with other safety and security services
	O10. Formalization of operational rules in terms of COVID-19 and access to training materials
Threats	T1. Lack of resources and personal protection equipment (inadequate quantity, unsatisfactory keeping sanitarian regime)
	T2. New formally obligated and COVID-19-related tasks for officers with limitation of prevention activities (e.g. in buildings)
	T3. Decreasing of operational efficiency and good psychological health of officers
	T4. Fire rescue service specification (shifts, direct contact of officers with victims, bystanders and other officers) generates permanent risk of affection on SARS-CoV-2
	T5. Fake news in media conduct to informational chaos and operational uncertainty
	T6. No (or lack of) knowledge concerning COVID-19 and its influence on fire rescue service operations as well as suppression of information about infection by victims
	T7. Fire rescue officers abstentions (infections, parental benefits, quarantines and sick leaves, difficult access to doctors)
	T8. No trainings and exercises (also for voluntary fire rescue services) and withholding of recruitment for new officers
	T9. No communication channel for public services
	T10. Permissions for additional job for fire rescue officers (e.g. in medical rescue teams)

*Source: Own study.*

In general, the results correspond with mechanisms of COVID-19 influence on public institutions and public life (Kaushal and Srivastava, 2021). Furthermore, they are related to widely implemented prevention and control strategies for the pandemic (Wang and Wang, 2020) as well as concern common factors determining current pandemic situation (lack of pandemic education, poor national procedures, response delays, lacking resilience etc.) (Lindhout and Reniers, 2020). In detail, the results reflect fire rescue service specification in multiple layers. The first layer is the service operational organization (shifts, dispatching, emergency rigors, substitutability, human resources constrains, management centrality etc.). The second one can be described as direct contact to people (infection ease after contact with victims, witnesses, bystanders, other officers).

Consequently the third layer is noticed – special safety requirements (the need of personal protection equipment, additional decontamination means and isolation of crucial resources). In-depth analysis of the layers inspires to look for the continuity manners in physical isolation, organizational flexibility, personal protection equipment, training and access to actual epidemic information. Their deeper cognitive exploration can help to manage societal security in COVID-19 conditions from the perspective of the operational continuity.

## 5. Discussion

The results allow to formulate manners which could serve for keeping pace fire rescue service with COVID-19. Basically, they can be analyzed from two points. The first one relies on strengths, weaknesses, chances and threats with the highest impact on the continuity. They can be understood as inspirations for formulation the manners or the manners themselves, and present a short-term perspective. The second one submits the results to an in-depth analysis. It focuses on long-term

perspective and gives foundations for operational continuity of fire rescue service in terms of COVID-19 and future biological hazards (Helfgott, 2018; Djalante, Shaw, and DeWit, 2020).

As far as the first point is concerned, the manners closely correspond to the hazard specification (e.g. transmission mechanisms) and the service operational conditions (the service shifts, infection possibilities during fire rescue actions, relative isolation of officers, preliminarily ensured access to personal protection means, centralization of emergency management, difficulties in winning new human resources over). This refers to general directions of epidemic response (CDC, 2020, WHO, 2020). What is cognitively interesting, these issues could influence on the manners positively or negatively. Thereby, some manners have their logical sources in the same aspects. Their perception depends on how fire rescue service has managed to face them. Table 2 presents manners which are formulated by authors on the base of SWOT analysis results and respecting the first of above-mentioned points of view.

**Table 2.** *Manners for managing societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service (short-term perspective)*

Related to strengths	Related to weaknesses
S1. Organization of 4-shifts system of service (officers in each shift are 24 hours on duty and then 24 hours at home; 2 shifts serve alternately in 2-weeks-long periods of time) which decreases a risk to freeze entire shift in case of COVID-19 affection	W1. Difficulties in keeping sanitarian regime (intervals and isolation) due to direct contact to victims and bystanders, supporting of health service units and multiple ways to spending own time
S2. Formalization of instructions, procedures and guidelines concerning COVID-19 sanitarian regime	W2. Low level of the service posts in the context of abstentions, retiring, parental benefits, quarantines and sick leaves
S3. Limitation of direct contacts between officers in daily system of service with officers at shifts and between shifts; high self-discipline	W3. Extended decision processes, lack of competent officers, limited possibilities to substitute for absent officers
S4. Physical isolation of dispatchers from other fire rescue unit officers (at shifts) and officers in daily system of service	W4. General overload of officers (many fire rescue actions, stress, psychophysical disorder)
S5. Limitations in stakeholders' service directly in the headquarter premises, possibility of documentation exchange via electronic post, teleconferences and videoconferences	W5. No reserves, inadequate number of personal protection equipment
S6. Reserves of disinfection means as well as equipment and personal protection equipment for officers participating in fore rescue actions	W6. Lack of funding sources in local headquarters for additional procurement of protection means and relatively high prices of the means
S7. Possibility of remote work for officers in daily system of service	W7. No trainings and exercises
S8. High competences, flexibility and involvement of officers	W8. Withholding of recruitment for new officers
S9. Implementation of on-line training system, transferring actual knowledge and guidelines about COVID-19	W9. Limited possibilities to prevention activities as well as engines and equipment service
S10. Access of dispatchers to actual list of people on quarantine, daily updated by state sanitary service or police	W10. Low quality of contact with other public services

Related to chances	Related to opportunities
T1. No (or lack of) knowledge concerning COVID-19 and its influence of fire rescue service operations as well as suppression of information about infection by victims	O1. Responsible operation respecting COVID-19 regime
T2. Fake news in media conduct to informational chaos and operational uncertainty	O2. Formalization of operational rules in terms of COVID-19 and access to training materials
T3. Fire rescue service specification (shifts, direct contact of officers with victims, bystanders and other officers) generates permanent risk of affection on SARS-CoV-2	O3. Collecting new knowledge about COVID-19 and social responsibility of officers and collecting new experiences
T4. New formally obligated and COVID-19-related tasks for officers with limitation of prevention activities (e.g. in buildings)	O4. Limitation to minimum of physical contacts with officers
T5. Permissions for additional job for fire rescue officers (e.g. in medical rescue teams)	O5. Cooperation with other safety and security services
T6. Lack of resources and personal protection equipment (inadequate quantity, unsatisfactory keeping sanitarian regime)	O6. Remote work for officers in daily system of service
T7. Decreasing of operational efficiency and good psychical health of officers	O7. Thorough and confirmed information from media and sanitarian service about pandemic situation
T8. Fire rescue officers abstentions (infections, parental benefits, quarantines and sick leaves, difficult access to doctors)	O8. Winning new funds and equipment from external entities (e.g. public administration and local entrepreneurs)
T9. No trainings and exercises (also for voluntary fire rescue services) and withholding of recruitment for new officers	O9. Increasing local headquarters' funds for necessary personal protection equipment, increasing access to disinfection means
T10. No one communication channel for public services	O10. Changes in training system (on-line courses, also for voluntary fire services)

*Source: Own study.*

Considering the second point, in-depth analysis of the SWOT may shed a light on the long-term perspective of the continuity building. Especially when many determinants should be taken into account at the same time (Hsu-His and Wen-Chih, 2006; Zavadskas *et al.*, 2016). Confrontation of the results with the service specification, good practices in the COVID-19 response (CDC, 2020; WHO, 2020) and general continuity recommendations (BS 25999, 2007; ISO 22301, 2012) allows to ascribe particular continuity factors into 4 dimensions: human, information, procedural and logistics. Table 3 indicates the results of the in-depth analysis.

**Table 3.** *Strengths, weaknesses, opportunities and threats for fire rescue continuity in COVID-19 conditions (long-term perspective)*

Human dimension	
Strengths	Weaknesses
- self-discipline	- general overload and stress
- responsibility	- non-compliance with rules and disregard of sanitary rules
- self-education	- concealing the truth about health
	- low staff numbers related to absenteeism
Opportunities	Threats

<ul style="list-style-type: none"> <li>- discipline and responsibility of officers due to the sanitary regime</li> <li>- the ability to learn from the experience of others</li> <li>- openness to knowledge and self-education</li> </ul>	<ul style="list-style-type: none"> <li>- lack of knowledge about the rules to operate in COVID-19 conditions</li> <li>- uncertainty and fear of officers in the face of fake news</li> </ul>
<b>Information dimension</b>	
<b>Strengths</b> <ul style="list-style-type: none"> <li>- organization of teleconferences and online briefings</li> <li>- telephone and email correspondence</li> </ul>	<b>Weaknesses</b> <ul style="list-style-type: none"> <li>- delays in decision-making</li> <li>- incomplete or late information</li> </ul>
<b>Opportunities</b> <ul style="list-style-type: none"> <li>- gaining knowledge about COVID-19</li> <li>- access to training materials on COVID-19</li> <li>- exchange of information and good practices between fire rescue units</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>- lack of knowledge / information about the potential effects of COVID-19</li> <li>- fake news</li> <li>- concealing information about the state of health</li> <li>- disinformation</li> <li>- lack of communication between the sanitary inspection and fire rescue units to the health status of citizens within the unit's operational area</li> </ul>
<b>Procedural dimension</b>	
<b>Strengths</b> <ul style="list-style-type: none"> <li>- implementation of 4-shifts system</li> <li>- implementation of instructions and rules to be met in the fire rescue units</li> <li>- isolation of dispatchers and the control rooms from the rest of the crew</li> </ul>	<b>Weaknesses</b> <ul style="list-style-type: none"> <li>- general overload and stress</li> <li>- non-compliance with rules and disregard of sanitary rules</li> <li>- concealing the truth about health</li> <li>- low staff numbers related to absenteeism</li> </ul>
<b>Opportunities</b> <ul style="list-style-type: none"> <li>- compliance with the sanitary regime</li> <li>- implementation of top-down legal norms</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>- disregard of procedures</li> <li>- the necessity to follow the procedure of providing assistance to the injured despite the uncertainty about their health condition</li> <li>- legislative guidelines - extending the scope of activities of fire rescue officers (assistance at border crossings, assistance in hospitals)</li> </ul>
<b>Logistics dimension</b>	
<b>Strengths</b> <ul style="list-style-type: none"> <li>- access to disinfectants</li> <li>- modern equipment, special clothing and personal protection means</li> <li>- application of new communication technologies</li> </ul>	<b>Weaknesses</b> <ul style="list-style-type: none"> <li>- lack of stocks of disinfectants</li> <li>- inadequate logistics of activities</li> <li>- limited or no financial resources</li> </ul>
<b>Opportunities</b> <ul style="list-style-type: none"> <li>- cooperation with other entities</li> <li>- rationalization of the planning process</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>- service facilities not adapted to the applicable sanitary regime</li> <li>- close contact with other officers as well as with victims and bystanders</li> </ul>

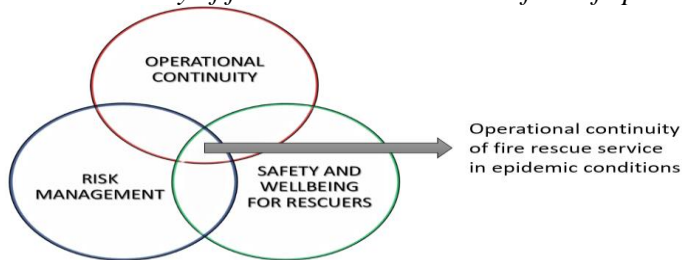
**Source:** *Own study.*

The results of the in-depth analysis prove that a comprehensive, holistic and long-term approach to ensure operational continuity of fire rescue service in the face of epidemic (not only COVID-19) should be multi-dimensional and involves parallelly many issues important from societal security point of view. Figure 2 shows our general idea for this approach.

Therefore, all future activities should balance between three areas – risk management, operational continuity as well as safety and well-being for fire rescue officers. We can assume that probably the areas will meet particular dimensions (human, information, procedural and logistics) in multiple ways and degrees, because different diseases could be characterized by specific pathogens,

transmission mechanisms and epidemic indicators (Shorey and Chan, 2020). In addition, fire rescue service should strongly respect its specification, just like health care institutions (Iyengar, 2020), private sector organizations (Nowacki, Grabowska, and Lakomy, 2020) and local societies as entireties (Migus *et al.*, 2020).

**Figure 2.** General idea for comprehensive, holistic and long-term approach to ensure operational continuity of fire rescue service in the face of epidemic



*Source:* Own study.

A primary issue that arises on the results is a staff potential to properly response on epidemic. The officers have a significant influence on capacity development for epidemic risk reduction (Iizuka, 2020). They should be motivated, physically protected, properly-equipped and informed. Also entire service must be resilient on epidemic consequences (health and operational ones). This could face many actual challenges in epidemic management related to early detection, wide national and international cooperation (Doosti-Irani *et al.*, 2020) and learning lessons from COVID-19 and other disasters (Romanelli *et al.*, 2020).

It is worth to emphasize that the approach areas state logical bridges to risk management system (ISO 31000, 2018), work safety management system (ISO 45001, 2018) and continuity management system (ISO 22301, 2012). So, ensuring the operational continuity can be integrated with other efforts in relevant management activities, no matter if such systems are introduced to the fire rescue services or not. This could create an interesting opportunities for human resources planning, implementation of the change management model, organization of trainings and creation of common information and knowledge space for the officers and disaster managers (from the service and outside it). The results of the research can be used in scientific works, but also as source material in expert analyzes. They can be used both by the management staff of public administration entities, including in a special way through the fire protection management board. The obtained results indicate a high value of the sense of individual security and well-being of human capital, the need for strategic planning in the perspective of change management and efficient risk management in the context of operational continuity.

## 6. Conclusion

COVID-19 has proved that emergency entities must protect people and themselves against the hazard. Not all of the entities are preliminarily prepared to operate in pandemic conditions, with potentially negative influence on safety and security. Fire rescue service seems to be one of the most crucial for response on epidemics and other hazards. The service continuity has a significant role in proper operation of the society and quality of human life, considering the most important, utilitarian values (human life and health).

Looking for manners to manage societal security in COVID-19 conditions from the perspective of operational continuity of fire rescue service, we involved fire rescue experts to identify the continuity factors (by implementation of SWOT analysis). This allowed us to name 40 factors which can be used as inspiration to formulate the manners or directly as the manners.

From the strengths point of view, there should be elaborated i.a. organization of 4-shifts system of service, formalization of instructions, procedures and guidelines concerning COVID-19 sanitarian regime, limitation of direct contacts between officers in daily system of service with officers at shifts and between shifts and high self-discipline. Facing the weaknesses, there ought to be enumerated (i.a.) additional personal protection means, flexible service system and limitation of additional activities of officers due to their general overload. Due to the opportunities, it should be mentioned about, for instance, current monitoring of respecting actual COVID-19 regime guides, systemic moderation of collecting new knowledge and experiences as well as formalization of operational rules in terms of COVID-19 and access to training materials. To limit the influence of the threats, work risk assessment needs to be evaluated, the risk should be commutated, access to actual and credible information about epidemic must be organized. Moreover, continuity plans and emergency procedures should be elaborated. These state commonly a catalogue of manners in the short-term perspective of implementation.

From the long-term perspective, we carried out the in-depth analysis of the SWOT results. This gave us foundations to formulate general manners and conducted to comprehensive and holistic approach to ensure the operational continuity in the face of epidemic (not only COVID-19). The approach is multi-dimensional and consists in risk management, operational continuity as well as safety and well-being for fire rescue officers.

Our research was not free from merit-related limitations. We focused only on one kind of the emergency services. Responders represented quite unique but narrow group of fire rescue officers. In addition, SWOT analysis gave us relatively general results, very specific for preliminary scientific efforts in the described area. Being aware of the limitations, we see further steps for the research by repeat it for police, medical service and public administration, involvement of other groups of responders who would represent management and administration posts in the fire rescue service as well as use of more quantitative tools to explore the problem (e.g.,

risk analysis for the continuity needs and business impact analysis). It is worth to highlight that the survey was carried out during first mounts of COVID-19 pandemic in Poland (it has been noticeably started since March 2020). So, a natural consequence for next research steps is to make comparison analysis with current pandemic situation, considering lessons-learned collected and implemented after a year of emergency response on SARS-CoV-2.

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