



**RABEK**  
Regionalna asocijacija za bezbednost i krizni menadžment



**GLOBAL  
SECURITY**

**4th INTERNATIONAL SCIENTIFIC - PROFESSIONAL CONFERENCE**

# **SECURITY AND CRISIS MANAGEMENT -THEORY AND PRACTICE**

*SeCMan 2018*

**PROCEEDINGS**



**OBRENOVAC 2018**

Proceedings SeCMan - 2018

## **FOREWORD**

*Manifestation **Safety for the Future** came from the idea and the need to see security problems as a whole, and yet separately, through a prism of scientists and experts to bring science, company practice and economy together. This year, for the fourth time, we are implementing this event, with new elements of research of security phenomena in the field of management, engineering and ecology.*

*Crisis management has become a daily necessity, necessary for the survival of an individual, company or society as a whole. The risk of event manifestations with negative effects cannot be assessed at the outset, but the confrontation with negative consequences is due to their manifestation. Scientific research into security phenomena has become a priority for the sustainable development of society.*

*Scientific findings do not always come to those who perform security tasks, such as physical or legal persons. Therefore, there is a need for scientists and experts to meet and exchange ideas, opinions and knowledge. Materialization of knowledge is carried out daily in the process of modern business. Exposed to the impacts of a turbulent environment, and focused on sustainability, modern business requires permanent monitoring of changes and adaptation to these changes.*

*Knowledge of the environment in which the modern society is located, is possible if it possesses the necessary knowledge of the phenomena that characterize it. Only knowledge provides an opportunity, preventive action through an efficient risk assessment system. Knowledge, formed as a symbiosis of science and profession, has only quality and strength, which guarantees the possibility of preventive action and an optimal level of readiness to react to negative events. The resistance of contemporary society to negative events depends on the degree of knowledge development.*

*Proceedings from the 4rd International Conference - Security and Crisis Management - Theory and Practice, presents a new value in the observation of a portfolio of security phenomena at the strategic, company, and individual level. The papers published in the proceedings are new findings and views of the author. A wide range of issues, confirms the assumption of the necessity of such a conference. The papers presented at the last two conferences have unambiguously demonstrated the need for regional cooperation and the harmonization of joint capacities.*

*The exhibition part of the event and practical demonstration exercises aim to ensure that consumers of implemented safety show new achievements and opportunities in solving various security problems. The intention of the organizer is, by carefully selecting the theme for demonstration exercises, to trace the way of applying the principles of practicality and the obviousness in the process of training and training the person to respond in different situations.*

***The Proceedings presents a source of new knowledge, assistance in solving security problems, it's a support for people who practically deal with security and it's a source of initiative to advance existing knowledge in the field of security and crisis management. By this way, we invite all stakeholders to improve the quality of future editions with their pappers.***

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## **CORRUPTION IN EMERGENCY SITUATIONS- UNAVOIDABLE PHENOMENON OF MODERN TIME**

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**Abstract:** *Corruption in the modern world has become a global problem. Despite the huge costs and damage to the economies of all countries, particularly its negative effects come to the fore in times of natural disaster or conflict. Misuse of funds for mitigation of emergencies have been reported in many countries. Methods of abuse are many: illegal disbursement to officials, "rigging" of the tender to privileged companies to eliminate consequences of disaster, misuse of funds intended for the elimination of consequences of natural disasters, deliberate reduction of public expenditure for the maintenance of existing infrastructure in good condition. The paper deals with corruption cases after emergencies in the European Union, in the United States of America and Japan. It was found that the effective implementation of existing legislation in the fight against corruption in emergency situations and stricter punishment. The research used normative method and legal and logical methods of induction and deduction. This paper is the part of research project no. 47009 (European integrations and social-economic changes of the economy of Serbia on the road towards the EU), financed by the Ministry of Education, Science and Technology of the Republic of Serbia.*

**Key words:** *law, security, emergency, corruption, Serbia*

## MODELS OF CRISIS

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**Abstract:** *Work is outlining the models of crisis behaviours which are focusing on crisis evoked by nature technologies and different social networks. It primarily signifies the resolution phases of those crisis and on the role of the subjects and effects of crisis situations. Emphasize is on the essence of crisis management and identification of it's activities throughout the crisis process elements evoked by different causes*

**Keywords:** *crisis, crisis management, models of crisis, crisis resolving.*

## OF LOSS OF WORK OF PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES IN THE REPUBLIC OF CROATIA (2015-2017)

Jovan Vucinic<sup>1</sup>, Nenad Mustapic<sup>2</sup>, Marijan Brozovic<sup>3</sup>  
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**Abstract:** *The paper deals with injuries at work in the field of professional, scientific and technical activities for the period 2015 - 2017. Over 60,000 employees are employed in these activities. Due to the nature of work and field work, it is to be assumed that by analyzing the available data, there will be useful information for undertaking certain measures and activities to reduce the number of injuries at work.*

**Key words:** *occupational safety, injuries, professional, scientific and technical activities*

### 1. INTRODUCTION

Since the beginning of 2013, a new Work Injury Form containing work injury data complies with the European Workplace Injury Statistics Methodology (ESAW methodology) is in force since the Republic of Croatia has been obliged to submit data on injuries at work of the European Union since the beginning of full EU membership to the statistical office in a form conforming to the ESAW methodology.

Pursuant to the above, the Croatian Institute for Health and Safety at Work analyzes data on workplace injuries occurring at the workplace according to parameters complying with the European Statistics Workplace Injury Methodology.

This paper analyzes work injury for the period 2013-2017 in the field of professional, scientific, scientific and technical activities, which includes the following activities:

- Legal and Accounting,
- Control,
- Architectural, engineering, technical testing,
- Scientific research and development,
- Advertising,
- Veterinary
- Other

The purpose of the research is to find out the possibilities to improve the conditions and processes of occupational safety, raise the awareness and culture of safety at work in the mentioned activities.

### 2. METHODOLOGY OF RESEARCH

#### 2.1. Problem

The paper raises the question whether, in these areas, the nature of injuries can also be reduced.

#### 2.2. Goal

Based on the analysis of the collected data, identify the possibilities of reducing injuries at the workplace.

### 2.3. Hypothesis

Injuries at work by taking certain measures and activities can be reduced.

### 2.4. Tasks

- Determine the number of injuries at the workplace by age,
- Analyze them by age, gender, days of the week, qualification and use of personal protection equipment (PPE) ,
- Make certain conclusions based on the analysis.

### 2.5. Methods

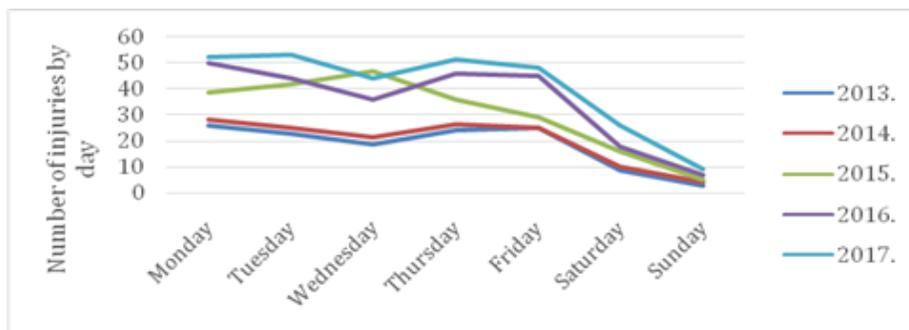
They will use methods of Documentation Analysis and Forms and Records for the observed period, and the Statistical Method.

## 3. RESEARCH RESULTS

This research will analyze the data obtained from the Croatian Institute for Health and Safety at Work and the Croatian Institute for Health Insurance in the observed time by certain elements.

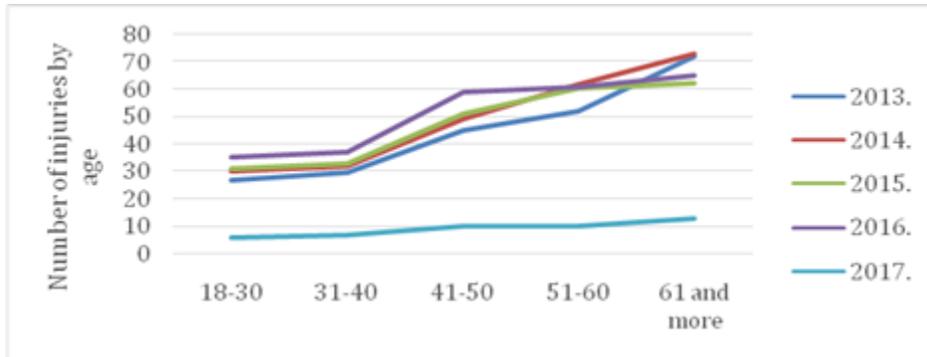
Table 1: Number of injuries at the workplace per day of the week

Days	2013.	2014.	2015.	2016.	2017.	Total
Monday	26	28	39	50	52	195
Tuesday	23	25	42	44	53	187
Wednesday	19	21	47	36	44	167
Thursday	24	26	36	46	51	183
Friday	25	25	29	45	48	172
Saturday	9	10	16	18	26	76
Sunday	3	4	5	7	9	28
Total	129	139	214	246	280	1008



Graph 1: Number of injuries at the workplace by days of the week

From the data it is apparent that most injuries occurred on Monday, which is to be expected with regard to other activities and works on weekends. Most gets tired, resulting in increased risk of injury. The frequency of injuries in the rest of the week is roughly even, except Saturday and Sunday, where fewer employees work in these activities.



Graph 2. Workplace injuries at workplace by age of worker

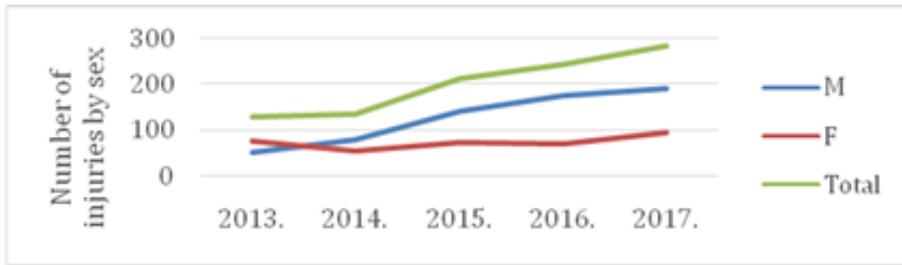
Table 2: Workplace Injuries by worker's age

Workers age (years)	2013.	2014.	2015.	2016.	2017.	Total
18-30	27	30	45	52	72	226
31-40	30	32	49	62	73	246
41-50	31	33	51	60	62	237
51-60	35	37	59	61	65	257
61 and more	6	7	10	10	13	46
Total	129	139	214	245	285	

The most injured in the observed period are workers aged between 50 and 60. The reasons for these injuries are probably in part in the fact of too much self-confidence with regard to long-standing work experience and work by prescribed rules

Table 3. Number of injuries reported at workplace by sex

Injured	2013.	2014.	2015.	2016.	2017.	Total
M	52	80	141	175	190	638
F	77	55	73	71	95	371
Total	129	135	214	246	285	1009
Total per year	11.252	11.444	13.161	13.281	14.431	63.569

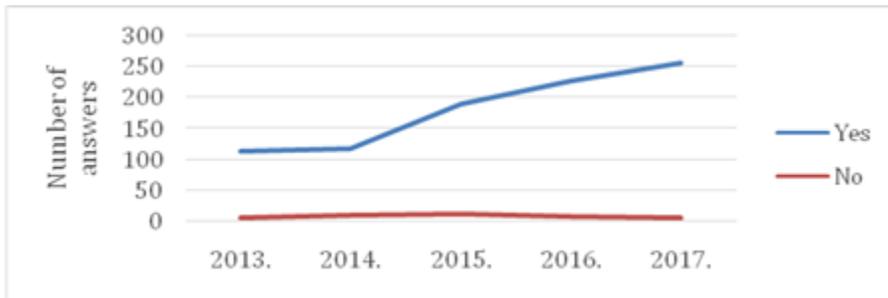


Graph 3: Number of injuries reported at workplace by sex

These gender differences derive from the fact of the nature of performing work tasks and the number of employees employed by gender. So far, there are more employees in these activities, men.

Table 4: Worker's ability to work safely

Qualification	2013.	2014.	2015.	2016.	2017.	Total
Yes	114	119	190	228	257	1393
No	8	11	13	10	7	66

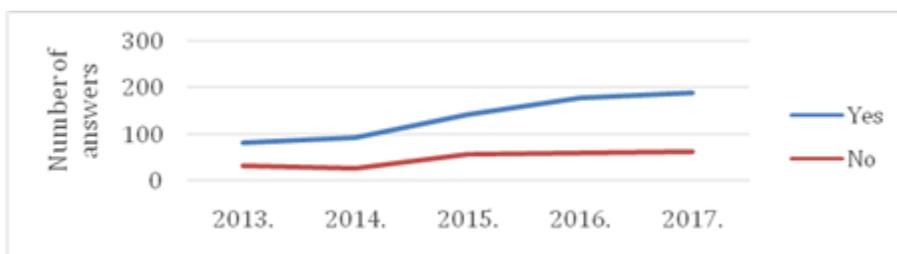


Graph 4: Workers' ability to work safely

By analyzing the data for the observed period, it is noted that it has been trained to operate in a safe manner from those injured by 908 workers, or 89.6%. They are either incompetent or have no indicators. Obviously a significant number of injuries are then caused by a human factor.

Table 5: Usage of Personal Protective Equipment (OSS) at the time of injury

Used OSS	2013.	2014.	2015.	2016.	2017.	Total
Yes	83	94	144	179	191	691
No	32	27	57	59	62	237



Graph 5: Usage of Personal Protective Equipment (OSS) at the time of injury

#### 4. CONCLUSION

The analysis of the available data shows that 63,569 injured workers were investigated during the period under review, where 1013 workers were injured in the workplace at the time, resulting in a total of 159% of the wastes from these injuries in the observed period.

The biggest number of injuries are on Monday and older people, which can be explained by the loss of motivation and sensory abilities.

Much is more injured, which is largely due to their higher number of jobs and the very nature of the job they are doing.

The fact is that about 31.2% of workers have no reason why they do not use personal protective equipment at work (they have, do not want to use for some reason).

Even in these activities, employers do not fulfill precise job injuries data, which makes it difficult to determine the facts, making it difficult to take measures and activities to reduce them.

#### LITERATURE

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## PROCESS OF MAKING EVACUATION AND RESCUE PLAN

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**Abstract:** *The main purpose of the evacuation and rescue plan is to protect people in a particular facility so that they can quickly and efficiently leave the facility in the event of a crisis. In order to successfully evacuate people from an object, it is necessary to make a good evacuation and rescue plan, which includes easy readability, carefully planned evacuation routes and a well-trained crew of people responsible for evacuation and rescue. In the Republic of Croatia, the obligations related to the preparation of the evacuation and rescue plan derive from the Law on Occupational Safety (Official Gazette 71/14, 118/14, 154/14), pursuant to Article 12, paragraph 6, which also includes the penalties imposed on the employer in the article 95 paragraph 2 in the event that the facility does not draw up a plan for evacuation and rescue. Likewise, obligations and blues related to the evacuation and rescue plan are prescribed in the Civil Protection Act (OG 82/15)*

**Keywords:** *evacuation and rescue plan, occupational safety law, civil protection law*

### 1. INTRODUCTION

According to the Occupational Safety Act NN 71/14, 118/14, 154/14, pursuant to Article 12, paragraph 6, any public space as well as the private space in which a business is carried out must have an evacuation and rescue plan so that evacuation can be carried out and the rescue of workers and other people who were found inside the facility during a crisis situation.

In order for workers and other people who have been hit by a crash saturation in a particular facility can safely and quickly evacuate from some space, it is necessary to have a well-designed evacuation and rescue plan, and it is also important to place the evacuation and rescue plan in a visible place and with the evacuation and rescue plan set up, and other signs or evacuation signs, alarm circuits, circuit breakers and other essential items closely related to evacuation.

Any person who has left the facility in a crisis situation has the obligation to arrive at the venue where he has to wait for a proxy from the responsible person. A person who is at a meeting place must not leave the same unless the responsible person so permits. The congress seat represents a certain safe location outside the facility where workers and other persons found in the facility during a crisis situation will meet after the facility leaves. The evacuation and rescue plan consists of two pieces, namely the evacuation and rescue plan elaboration and a graphic representation of the evacuation and rescue plan.

## **2. LEGAL FRAMEWORK**

When drafting a plan for evacuation and rescue in the Republic of Croatia, it is necessary to use the guidelines of the Occupational Safety Act (OG 71/14, 118/14, 154/14), the Civil Protection System Act (OG 82/15) and the Law on Fire Protection (NN 92/10) which provide strict instructions for the design of the protection and rescue as well as a graphic representation of this designation within the building. According to the Occupational Safety Act, the obligations of the employer and the responsible persons are prescribed on the manner of training, evacuation and selection of responsible people. Some of the obligations are: Establishing signs for evacuation and rescue, carrying out evacuation and rescue exercises, and taking care of the availability of the necessary means for evacuation and rescue. In addition to this, it is necessary to bear in mind that there is no prescribed methodology for drafting an evacuation and rescue plan and that it is necessary to have a team of people who will be able to create a quality evacuation and rescue plan with their multidisciplinary knowledge and skills that will really be able to be applied in practice

## **3. ELABORATIVE PLAN FOR EVACUATION AND RESIDENCE**

Elaboration of the evacuation and rescue plan is a textual document containing all the information about the facility for which the evacuation and rescue plan has been drawn up, and all the parameters used in the drafting of the evacuation and rescue plan graphic design.

Elaboration of the evacuation and rescue plan should include:

- foundation for the evacuation and rescue plan (List of laws, regulations, general acts of the employer)
- information and facility for which an evacuation and rescue plan has been drawn up analysis of possible adverse events and their consequences
- state of the object (number of employees and purpose of the facility)
- Detection Mode and Alarm Mode
- a list of equipment and means for evacuation and rescue
- list and analysis of the evacuation routes (length of the road and the width of the passage / door / exit)
- list of berths
- the type of lighting and the marking of the exit routes
- a list of fire extinguishers
- list of hazardous working substances
- ways of evacuation and rescue
- the method of evacuation and rescue in case of fire
- training program for evacuation and rescue
- a list of employees who are trained to evacuate and rescue
- a list of staff trained to provide first aid
- information on the implementation of evacuation and rescue exercises measure plans

In addition to the above content the evacuation and rescue plan should include the following:

- instructions for evacuees and rescuers from the ruins
- instructions for the evacuation and rescue guide from the ruins
- blueprint guidance
- contact list of responsible persons and competent institutions
- a graph of the evacuation and rescue plan

## **4. GRAPHIC PART OF THE EVACUATION PLAN**

The graphic part of the evacuation and rescue plan is the ground plan of the facility where the directions and evacuation paths, the location of the first aid cabinet, electrical switches, evacuation lighting and other items are shown in Table 1.

**Table 1:** Labels for the graphic part of the evacuation plan

Label	Description of the label
	Exiting the room
	She laughs at the meeting place
	Fire extinguisher
	Main circuit breaker
	Evacuation lighting
	Hydrant
	Your location
	Fire detector
	North mark
	First Aid Cabinet

These labels are placed on the graphic part of the evacuation and rescue plan and are set up with descriptions and on the graphic design itself as a legend, in addition to the information on the signs, the graphic plan must contain information about the legal people who created it. In addition to these markings, it is useful to place the number of rooms on the inside and outside doors so that people in the facility can easily provide the information they are on when calling for assistance.

#### **4.1. Synchronizing the floor plan**

In order to create an evacuation and rescue plan that can be implemented, it is necessary, in the case of an existing building plan, to match the actual condition of the building. Main reasons for this are changes in most of the existing housing / business and other areas, that is, they have been made more than five years ago, and there is a great possibility that structural changes are being made to them, thus jeopardizing the viability of the evacuation and rescue plan. Additionally, it is important to draw room clutter on desks, cupboards and other objects that reduce free space, thus preventing the free movement of the room. In addition to charting items in the object, it is necessary to add the direction of opening the door and the window location.

#### **4.2. Set up labels for a graphic evacuation and rescue plan**

After performing the work from point 4.1 and reviewing or aligning with the real situation of the structure of the building it is necessary to:

- to determine the evacuation paths
- mark the locations of all the items in Table 1.
- to determine the venue

In practice, when performing point 4.2. uses the printed floor plan in accordance with the realistic condition of the object specified in point 4.1, and the numerals are most frequently used when marking the items in Table 1. to facilitate the process and accelerate the process of computer-generated graphs of the evacuation and rescue plan itself



In accordance with the generated evacuation and rescue charts as per point 4.3. it must be placed in a visible place previously selected in the space and in the plan graphically marked with "Your Location".



**Figure 4:** A presentation of the final evacuation and rescue plan

## 5. PROGRAM OF TRAINING OF WORKERS

Workers who have been selected as responsible for evacuation and rescue operations must be trained according to the prescribed program, which is part of the evacuation and rescue process. The reason is that all objects are different and that some actions do not have to be undertaken and that the same worker has no obligation to train. People selected to conduct evacuation and rescue are required to undergo training on the plan and program for the premises in which they serve their duties. The evacuation and rescue people training plan and program must include all possible critical events and details of the facility itself.

## 6. EXERCISES FROM THE EVOLUTION COURSE

Evacuation and rescue exercises must be carried out at least once within two years. The head of evacuation and rescue in case of need may require more frequent exercises. The head of evacuation and rescue according to the Occupational Safety Act (OG 71/14, 118/14, 154/14) selects an employer who also has to fulfill the obligations in accordance with Article 55, paragraph 5 of the evacuation and rescue exercise. It is common practice that evacuation and rescue exercises are announced, and when exercising the exercise itself, it is important to keep strict records:[1]

- Date, hour and minute of the beginning of the exercise
- Date, hour and minute of exercise completion
- Number of participants in the exercise
- Achieved Results
- Observed shortcomings

Such a document shall be drawn up in two identical copies and shall be archived for a period of at least 2 years. After the conducted evacuation and rescue exercise, the same must be analyzed in order to draw up a final report that the practitioner has to do within 20 days of the end of the exercise. The final report shall be submitted to the competent authorities in electronic form, and to the people responsible for carrying out evacuation and rescue for the facility where the exercise was conducted.

## **7. CONCLUSION**

When designing the evacuation and rescue plan, we have to keep in mind that there is no legal framework for designing the same and that without the knowledge of this area the plan is not feasible. It should also be borne in mind that the evacuation and rescue plan is equally important to the worker who performs the work tasks provided for in the employment contract as well as the people found in the premises, and must therefore be as clear and easily readable as possible for all people his reading or viewing could quickly and safely evacuate from space.

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## POSSIBILITIES FOR EMERGENCY STAFF STRUCTURE STANDARDIZATION

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***Abstract:** The purpose of the paper is to look at the possibility of standardization of the internal emergency staff structure. The specificity of emergency management is that these situations occur unexpectedly, i.e. suddenly. Appearing, that situation sets out tasks to management system that do not correspond to the standard operating regime of the organization and its earlier experience. The considered organization model of the staff is a system tool used for command, control and coordination of emergency response. The model has been developed due to the shortcomings observed during emergency response, it is flexible and can be used for incidents of any kind, type, volume and complexity. The paper discusses the issues of specificity of emergency situations management and the possibility of applying the model of the staff organization. It is concluded that the considered model can be used in the current circumstances, with previous testing in exercises and practice.*

***Key words:** model, emergency, staff, commanding*

### 1. INTRODUCTION

Response to an emergency is a serious challenge and requires decisions that must be made in adverse circumstances, while at the same time, an emergency generates barriers to the quality decision making process. In emergencies, information management is a particular challenge. The functioning of the emergency management system has a number of specificities in comparison with the functioning of traditional management systems. This requires a different approach to the organization of the key management lever of the system, the emergency staff. An incident command model is a system tool used to command, control, and coordinate emergency response. It includes procedures to form a control structure that controls resources, facilities, equipment, and communications. For the successful implementation of this model, it is very important to establish emergency management staff before the emergency creation and to position it in the entire system, with clear responsibilities and a clear chain of command. The efficient establishment of the system would be assumed by the implementation of a unique set of measures and activities for managing in emergencies.

### 2. EMERGENCY MANAGEMENT SPECIFICITY

Management means leadership in an organization while in functional sense it includes tasks and processes related to the organization's current activities. Individually, it includes planning, organization, implementation and control. Responding to an emergency situation is a serious challenge and requires critical decisions that must be made in adverse circumstances. At the same time, an emergency generates barriers to a quality decision-making process. Common problems are multiplying exponentially and managers have to deal with complex problems in the context of information deficiencies, unstable environments and stress.

The specificity of emergency management is that emergencies occur unexpectedly, ie, suddenly. Appearing, those situations set tasks to mngement system that do not correspond to the standard operating regime of the organization and its earlier experience. Countermeasures require urgency and quick adaptation to the new situation. Under such conditions, there is a risk of panic, and managers of all levels must have a clear picture of the situation. Based on the analysis of the functioning of the emergency management system, a number of its specificities can be distinguished compared to the functioning of traditional management systems (Table 1) [1].

**Table 1.** Compared characteristics of management

<b>Routine situations management</b>	<b>Emergency situations management</b>
Standard regime of functioning, known tasks and procedures	Various regime of functioning, unknown tasks and procedures
Solid structure and clear division of functions	Lack of solid structure and unclear division of functions, flexibility and agression
Narrow functional focus	Wide and unpredictable area of action
Monostructure	Polystructure
Defined flow of information	Dependance of information flow on current situation
Precise and confirmed informations	Unprecise and unreliable information
Information overload	Lack of information
Low level of changes	High degree of changes
Need for inter organizational coordination	Need for inter and intra organiyation coordination
Use of familiar terminology	Problems with unfamiliar terminology
Foreseable situations	Unpredictable situation; focus on previous expereince does not have an effect
Unity of authority and acauntability principle	Combination of uity of command and acauntability division
Functional potential	Organiyational potential
Local media interaction only	All media interaction
Dominant role of socio-economic goals and function criterium	Goals – efficiency, effectivness Criteriums – minimum needed time, minimum losses

The initial phase of the emergency poses a dilemma for the managers in the sense of identification of the situation because it must be concluded from the limited and fragmented information in which dynamic part the situation is. This dilemma has the consequence on allocation and direction of the resources. The complexity of emergencies makes it difficult for managers to assess its nature. The manager is limited by the essential complexity of the conditions and characteristics of the underdeveloped situation and the resulting uncertainties. The unreliability of the response may arise from an initial lack of information or a wrong initial classification, or from a change in the nature of the incident itself during its development. Emergencies imply maintaining a balance between the need to know the necessary and the need for situation control. Emergency situations are characterized by an explosion of information and communication, while the lack of reliable information continuously poses a problem for decision-makers. In emergency situations, information management is a particular challenge because there is a huge number of inaccurate and unreliable information that creates a space for creating rumors, which at the same time makes decision making difficult. Emergency situations generate the creation of pressure on

the routine decision-making structures, but these routines can be efficiently bypassed. The dilemma of a centralized or decentralized approach to managing emergency situations is to be resolved through centralized management, but decentralized execution of foreseen roles. Regarding the participation in the response, the public sector is very much in need of support from other social sectors because their resources are a vital supplement and support to public sector resources.

The commencement of the system response during emergencies is associated with non-standard, extraordinary and radical measures that are divided into strategic and operational. Strategic measures are related to the significant reorganization of the existing management system, the formation and start of the new functional structure of the system, the organization of emergency services – first responders, the implementation of a new functions, the adoption of certain contradictions, the formation of a new information environment and an appropriate information system. Operational measures do not fundamentally change the usual organizational relationships and are reduced to the management and implementation of standard functions related to the provision of continuous operation of the management system in new conditions.

### **3. INCIDENT COMMAND MODEL**

The incident command model is a system tool used to command, control, and coordinate response in emergency situations. There are also different views in which it is a set of personnel, policies, procedures, infrastructure facilities and equipment integrated into a common organizational structure and designed to improve the response to emergency situations and operations of all types and complexities that are being undertaken at that time. [2] Its main purpose is to establish a standard emergency management procedure, which will help emergency services to have a systematic and coordinated approach and a single command when responding. The reason for the development of this model lies in the shortcomings observed during emergency response: non-standard terminology, lack of organizational flexibility, non-standardized and non-integrated communications, lack of action plans and lack of dedicated facilities. This model is flexible and can be used for incidents of any kind, type, scope and complexity. It is intended to provide a comprehensive and cascading response to the organization, providing a common framework in which members of various agencies or services can effectively and effectively act. It contains standardized procedures that reduce problems and avoids terminological and communication misunderstanding among different agencies. Procedures must be established before the incident happens and it is also assumed that the personnel is trained for its application.

This model includes procedures to form a temporary control structure that controls resources, facilities, equipment, and communications. [3] It is conceived and designed to be used or applied from the moment of the incident until the need for incident management and operation ceases to exist. The model allows its users to adopt an integrated organizational structure to respond to complex, isolated but also multiple incidents, establishes common processes for management. At the same time, it enables the integration of facilities, equipment, personnel, procedures and communications within the organizational structure as well as a coordinated response between various agencies, both public and private. This approach to the organization of incident commanding could be used at all levels of government, depending on the internal organization of a particular state, but it is also used by non-governmental organizations and the private sector. [4] It combines several essential elements: commonly accepted terminology, integrated communications, unique command structure, resource management, and planning. It is applicable in various disciplines and includes in principle the following functional areas: operations, planning,

logistics and administration and finance. [5] All these functional areas could be used according to the needs of the incident. The field of intelligence is an optional functional area that can be activated as needed. The range of effective command and control ranges from three to seven subordinate organizational units.

This model also implies the standardization of the title of individual duties, especially in the commanding segment, but also the standardization of the name of lower organizational units. This avoids filling positions with unqualified personnel and avoiding confusion. The model is conceived as interdisciplinary and it is organized to provide a sufficient degree of flexibility and it is especially important for emergency services, as it should enable their action until specialized agencies or services come. It is very useful and does not only allow for the incident management structure but it also leads the process of planning, building and adopting a new structure. The model also envisages a standardized internal organization scheme for emergency staffs/HQs, and the formation of all functions depends on the level and extent of the emergency situation. The special quality of this model is joint command of more engaged agencies, thus achieving unity of effort. This model also provides for the establishment of territorial staffs that can control incidents that exceed administrative constraints. The use of this model for day-to-day incidents or planned events helps maintain the skills required for wide-range incidents.

#### **4. EMERGENCY MANAGEMENT STAFF**

For the successful implementation of this model, it is very important to establish emergency management staff before the emergency creation and position it in the entire system with clear chain of command. This staff would be a team of several key qualified persons. The Chief of Staff would have overall responsibility for managing and coordinating the activities of the emergency management staff. He would be in charge of assembling the staff, activating and directing the initial activities, directing operations, reporting on the course of actions, identifying the importance of deciding and deactivating the staff. The Operations Manager would be tasked with assigning tasks to the personnel for the conduct of operations, overseeing the implementation of operations, controlling the operation of an integrated operating center, assessing and analyzing, delivering resource requirements, reporting on activities, and organizing planning of further operations through a planning officer. The Planning Manager would be responsible for creating an action plan in a particular emergency situation, developing contingencies, identifying resources, periodically forecasting and developing future plans, as well as recovery plans from an emergency situation. In the operations sector, communication and information systems managers as well as the managers for the use of airborne assets could be separately identified. The information collection manager would be in charge of pointing to essential elements of information and other requested data that support the implementation of the activities and response operations, identify the necessary resources to monitor the situation in the areas in which the emergency situation takes place, plan and direct resources to obtain the requested information according to the Data Collection Plan, made available information to decision makers. It would be functionally in charge for data collection resources as part of the overall structure. The Logistics and Finance Manager would organize his section, assess the necessary resources, material, transport and other resources to support operations, plan medical support, and manage additional resource requirements. The Resource and Administration Manager would be responsible for monitoring the person engaged, keeping a staff list, tracking status issues, replacing and training personnel, and resolving other administrative matters. In addition, it is desirable to have a person in charge of public relations, since this activity is carried out continuously throughout the whole staff

engagement cycle, even before and after the activation of the staff. Where necessary, legal advisors and consultants may be engaged in the staff in certain areas.

The Emergency Management Staff must be mixed and should receive data from all segments of the organization and to be functionally linked to an integrated operating center as a point in which all data is to be collected. This staff should meet periodically to update the response plans and risk assessment and should be made up of experienced managers who, in addition to their basic competencies, should have developed communicative abilities. This team of people should be characterized by high cohesion and degree of trust, since each of the individual skills has an important role in designing the overall response to an emergency situation. In this sense, the limitation of the effectiveness of the staff is presented through interpersonal conflicts, oversized staffs and ineffective decision-making. The use of such staffs becomes a practice, although their use has both positive and negative sides. Nevertheless, during the work of the emergency management staff, some of the following problems may arise: misunderstanding of the hidden symbolic aspects of the emergency situation, inability to make a decision due to lack of information, lack of interest and involvement of senior management, psychological unpreparedness of staff members, group thinking, verbal aggression, machiavelism (a member of the staff wants to look "good" and forcing his own opinion only). These disadvantages can be eliminated by more frequent meetings and training and staff exercises in order to strengthen cohesion and positive interaction.

## **5. MEASURES AND ACTIVITIES OF EMERGENCY MANAGEMENT SYSTEM**

A unique set of emergency management measures and activities, an integral part of which would be the standardization of the structure of emergency staffs, would consist of four elements: formalization, preparedness, training and resource development, and information management. Through the implementation of the elements, the system would provide its own effectiveness

The role of formalization in the development of a system that would reduce the potential for emergencies would be in the definition of system parameters, within which it could act in a responsible manner and to complete the purpose and the purpose of the existing legal framework. There is a need to define the future legal framework, and effective compliance with the normative - legal framework can only be developed if there is a clear legal and normative regulation, regardless of the type of activities being implemented. In order to fulfill the task, it is necessary to review and evaluate all activities that will be undertaken including: general administrative information, monitoring and control, identification of risks and potential situations. The benefit of a such an approach would be the identification of the area to be addressed, the establishment of a list of potential emergency situations, the determination of the extent of the measures to be taken in accordance with the ongoing efforts being undertaken. Once developed and applied review of the activities must be constantly updated. This could be achieved by reviewing current responses and by conducting a detailed audit of each element of business or activity. This activity is an initial step in order to reduce vulnerability. The next step is to organize operations and the control chain has a critical role in the process. It is necessary to ensure that all levels of management become part of the program. [6] Every organization should be aware of the situation in which it is located and, in relation to circumstances, build its own organizational culture.

Preparedness in the broadest sense means all measures taken to prevent, prepare, respond, avoid and recover from an emergency. There are four critical aspects of preparedness: preparation and prevention, detection and classification, response and avoidance and

recovery. Preparation and prevention includes a set of activities that seek to prevent the occurrence of an emergency, reduce the likelihood of occurrence or reduce its adverse effects. These activities include primarily but not exclusively: the development and implementation of emergency management programs, the development and implementation of procedures for the implementation of an emergency management plan and the development and implementation of emergency management training programs at the response phase. Detection and classification includes activities that identify, assess and classify the severity of the emergency situation. These activities include: activating emergency management systems, activating procedures for implementing an emergency management plan and activating an emergency management organization. Response and avoidance includes activities undertaken in order to save lives, prevent further damage and reduce the effects of an emergency. These activities include: emergency management operations, operations of organizations that provide support to dedicated organizations, and continuity of business and activities. Recovery includes activities that return the condition to normal or safer, upon completion of an emergency. These activities include undertaking the following measures: activation of organizations and agencies for recovery, coordination of activities of organizations and agencies that help the organization for emergency management and activation of the recovery plan.

Training is the third component of this approach to managing emergency situations. Training of an emergency management organization is one of the critical factors that must be realized in order to achieve adequate capacity to undertake measures and activities during action. Developing a training program, including all levels of leadership and achieving the required level of preparedness is part of the overall process. To achieve this, training is necessary. System approach to the preparation of an effective training program consists of: task analysis, lesson building, instruction and grading. [7] In addition to the formal training program, there is also a need for specialized training for individual duties. This is achieved by establishing a program that complements training with various exercises and training procedures. The program can have different levels of complexity and weight.

Information management arises from the need to establish a unified emergency management program. The emergency management process does not end with the development of the plan, but by undertaking measures of compliance with the foreseen measures and procedures, which involves the engagement of the management and the trained personnel. In order to facilitate planning, all initiatives must be recorded. These notes serve to document achievements, demands and create attachments to the various requirements of the program. Commitment to the domain of obedience, readiness for response and training is important. Establishing a clearly defined management information structure will ensure that all documented materials are available as needed. Senior management levels must be constantly informed as a key tool. Information is expensive and must be handled and exchanged efficiently. They are particularly critical during emergency situations, which is why there is a need for an active system that will provide information about resources, personell and capabilities. It is extremely important to have a system (including a backup system) that will serve to identify, catalog, prioritize and monitor items related to management and response and emergency response activities.

## **6. CONCLUSION**

The organization of each country for the protection of citizens and property is primarily a security and economic issue. The enormous damage caused by the effects of various emergencies affects mainly ordinary citizens, and the need for organization to reduce their effects is necessary. Emergencies are often milestones between different social and political

arrangements and there is no "silver bullet" that solves every situation. Various "solutions" only generate an illusion of control of an emergency, which does not correspond to its context.

Emergency management aims to avoid or reduce victims and losses, to respond effectively, and to provide a quick recovery after response. It is a continuous process that involves the development of strategies and plans that seek to reduce the effects of such situations. Knowledge and competence is a prerequisite for the effective implementation of a range of activities. Insufficient knowledge of this field of activity results in the absence of a program segment of the management system and thus the absence of education for the area

The proposed concept of the organization and structure of the emergency staff would abandon the current concept of their formation and focus on developing the skills needed to respond to emergencies. The proposed model of the staff could give a new quality or point to some areas that need to be improved in services and systems intended for emergency management. The model is a comprehensive, integrated and flexible program for developing leadership and management capabilities. Nevertheless, despite all of the foregoing, the proposed model could certainly be applicable and usable but should be piloted first in exercises (especially computer assisted simulation) and perhaps in practice in emergency situations of lower intensity or potential damage, and on the basis of this, than draw conclusions about its further application. Establishing a complete and efficient emergency management system is the obligation and duty of every organized society.

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## APPLICATION OF THE LAW ON SAFETY MEASURES WHEN HANDLING CASH AND OTHER VALUES IN THE REPUBLIC OF SRPSKA

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**Abstract:** *Wanting to raise safety to a higher level, especially the Sector for handling cash and other values, National Assembly of the Republic of Srpska adopted the Law on Safety Measures When Handling Cash and Other Values on April 17, 2016. The basis for adoption of the Law was found in the international standard ISO 31000:2016 defining the principles and general guidelines for risk management. The adoption of the Law has created a legal framework that will enable the effective implementation of basic security measures when handling cash and other values, reduce risks and prevent the employees from committing criminal offenses and violations of personal and property safety. The Rulebook on Vulnerability Assessment when handling cash and other values, adopted on December 29, 2016, explicitly prescribes the assessment procedures. This paper will analyse the application of the Law and the Rulebook in practice, based on the personal experience of this article's author.*

**Key words:** *vulnerability assessment, physical-technical security*

### 1. INTRODUCTION

The reasons for the adoption of the Law on Security Measures When Handling Cash and Other Values are contained in the need to raise security on a higher level when handling cash and other values and to use appropriate preventive security measures in order to protect people and property, as well as to reduce the risk for the employees and their property<sup>1</sup>. Failure to implement security measures, often internally regulated by the agreement of service users on the one hand and service providers on the other, sometimes results in the adoption of inefficient protection systems that have often violated citizens' privacy. In this way, today's overwhelming need for people and property protection, a novelty in this area, has been put into question. The increase in crime, especially property crimes, contributed to a more serious understanding of the need for this field's development. Positive experience in the region, especially in Croatia, has also influenced the initiative for further overall improvement of the security system in the Republic of Srpska by adopting the aforementioned Law. "Recognising the fact that in the field of handling cash and other values it is necessary to apply all available measures in order to minimise the crimes affecting the employees and their property when abiding by the Law on Handling Cash and Other Values, and in order to draft the Law and all that with the aim to create the most efficient protection possible for people and property. Taking into consideration the aforementioned reasons, as well as the fact that, from a security point of view, the subject area is always current, the drafting of the Law on Security Measures when

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<sup>1</sup>The Law was published in "The Official Gazette of the Republic of Srpska", no. 33, on April 30, 2015.

Handling Cash and Other Values has begun, and opinions of other Ministries and special organisations were also obtained, in accordance with the Article 17 of the Rulebook on Work Regulations of the Government of the Republic of Srpska.”<sup>2</sup>The increase in criminal offenses, which was undoubtedly influenced by the selective application of the basic security measures, forced the legislator to adopt the Rulebook that clarifying the Law application in practice. The Rulebook on Vulnerability Assessment when handling cash and other values was adopted on December 24, 2016 and published in “The Official Gazette of the Republic of Srpska” on December 29, 2016. For the first time, the Rulebook defined the procedure for drafting the Act on Vulnerability Assessment by referring to the standard *BAS ISO 31000*.<sup>3</sup>

## **2. THE LAW ON SECURITY MEASURES WHEN HANDLING CASH AND OTHER VALUES**

The Law prescribes basic security measures for legal and natural persons handling cash and other values, determines the degree of security measure implementation, the manner of security measure application, cash and other values’ transport and transfer, protection and processing of the data obtained by means of technical protection, supervision. The provisions prescribed by the Law do not apply to facilities, premises and employees in legal entities if security is provided by the Ministry of the Interior of the Republic of Srpska.

This definition discriminates between entities dealing with the same or similar tasks, in terms of implementation of the basic security measures, i.e. the possession of an Act on Vulnerability Assessment when handling cash and other values. Namely, it is not clear who and in what way performs inspection supervision over the entities that are obliged to apply the provisions of this Law, and are related to the Ministry of the Interior of the Republic of Srpska regarding security. The Article 14, Paragraph 2 of this Law prescribes that the inspection supervision over the implementation of this Law is carried out by authorised officials of the Ministry. The question arises if the Ministry of the Interior is responsible for the safety of the facility, and if so, how can they inspect themselves then? If something like

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<sup>2</sup>Excerpt from the explanation of the Law on Handling Cash and Other Values, which was adopted on April 17, 2015 and published in “The Official Gazette of the Republic of Srpska” on April 30, 2015.

<sup>3</sup>This international standard may be used by any public, private or socially owned company, association, group or individual. Therefore, this international standard does not apply specifically to any industry or sector. For easier access, various users of this international standard are designated as the general term “organisation”. This international standard can be applied during an organisation’s existence and on a wide range of activities, including strategy and decisions, operations, processes, functions, projects, products, services and assets. This international standard can be applied to any type of risk, whatever its nature, whether it has positive or negative consequences. Although this international standard provides general guidance, it does not aim to promote the uniformity of risk management in all organisations. When designing and implementing risk management plans and frameworks, the different needs of a specific organisation, its specific objectives, context, structure, operations, processes, functions, projects, products, services or assets should be taken into consideration and specific employee practices should be applied. This international standard is intended to be used to harmonise risk management processes in existing and future standards. It provides a common approach to support standards that deal with specific risks and/ or sectors, but does not replace these standards. This international standard is not intended for certification. Source: Institute for Standardisation of BiH, <http://www.bas.gov.ba/standard/>

this is even possible, further questions are raised regarding the objectivity of the inspection. Thus, the inspection supervision originating from the entity that carries out the facility security and has the obligation to apply the mandatory protection measures opens the space for the absence of the objectivity of the assessment. In the same Law, agencies dealing with physical and technical protection are strictly prohibited to engage in the assessment activities defined by the said Law.

The Law prescribes the basic (minimum) security measures for the protection of people and facilities handling cash and other values (Article 4, Paragraph 1 of the Law):

- means of technical security
- physical security
- combined application of technical and physical security measures.

Taking into consideration that the prescribed (minimum) security measures are presented too broadly, the legislator categorised the subjects under the Article 5 that are obliged to apply the protection measures:

- I category- banks and their organisational units and post offices and their organisational units,
- II category- exchange offices, microcredit organisations, casinos, lotteries, sports betting and similar,
- III category- ATMs,
- IV category- legal and natural persons handling cash and making a daily turnover of cash in the amount of more than BAM 5,000.

After the basic (minimum) security measures and the categorisation of the subjects were prescribed, the Legislator clearly defined the basic security measures in the Article 6:

- 1) anti-burglary systems with emergency alarms,
- 2) alarm systems in case of emergency (anti-burglary systems)
- 3) video surveillance systems, continuous or occasional, with possibility of storing data,
- 4) installation of impenetrable baffles and anti-burglary doors on the part that separates working premises from rooms that are accessible to customers or other service users, and
- 5) physical security of facilities and premises.

According to Paragraph 4 of this Law, a legal or natural entity is obliged to pass a special general Act which prescribes the application of basic security measures. This view may question the application of the Rulebook on conditions and manner of implementation of technical and physical security, which regulates who and under what conditions can deal with the affairs of the subject protection.<sup>4</sup>

The question refers to the vagueness surrounding the adoption of an Act that will define the basic security measures. Bearing in mind that the Law is above the Rulebook, it is clear that law obligator will pass the requested act on the application of basic security measures. But is the law obligator competent to understand the basic security measures, or do they have to know them, It would be much clearer and more acceptable if the law regulated the obligations of the law obligator to regulate all the tasks from the drafting of the act to the implementation of the system from a company registered for performing physical and technical protection tasks. This is because the law obligator, due to the lack of understanding of physical and technical protection, as well as the reduction of the implementation of its costs, can predict the scope of protection that does not meet the real needs of the facility or premises in which the activity is performed.

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<sup>4</sup>“The Official Gazette of the Republic of Srpska”, no. 85, on September 11, 2012.

The Article 8 of the Law seeks to define more clearly the application of basic security measures in categorised facilities referred to in Article 5 of this Law:

(1) Law obligators in I category are obliged to provide the basic security measures referred to in Article 6 in cash-handling facilities, as follows: anti-burglary system with emergency alarms, emergency alarm system with video surveillance system, continuous or occasional, with the ability to store data.

(2) Law obligators in II category are obliged to provide in basic cash-handling facilities and premises, the basic security measures referred to in Article 6, as follows: anti-burglary system with emergency alarm and video surveillance system, continuous or occasional, with the ability to store data.

(3) Law obligators in III category are obliged to provide the basic security measures referred to in Article 6 in cash-handling facilities and premises, namely: a video surveillance system, continuous or occasional, with the ability to store data, and open door alarm installation of the treasury part of the ATM.

(4) Law obligators in IV category are obliged to provide the basic security measures referred to in Article 6 in cash-handling facilities and premises as follows: anti-burglary system with emergency alarm, emergency alarm system and video surveillance system, continuous or occasional, with the ability to store data.

(5) Law obligators in V category are obliged to provide basic security measures referred to in Article 6, in cash-handling facilities and premises as follows: video surveillance system, continuous or occasional, with the ability to store data.

### **3. RULEBOOKS DERIVED FROM THE LAW ON SECURITY MEASURES WHEN HANDLING CASH AND OTHER VALUES**

The Article 17 of the Law prescribes that the Minister of the Interior of the Republic of Srpska, within six months from the entry into force of the Law, passes regulations on:

- resource standard and quality for the application of basic security measures
- vulnerability assessment of the law obligator
- cash and other value's transport and transfer

As stated in the Introduction, it is a Law that seeks to regulate the security sector for the first time by applying certain security measures with a large number of law obligators. The legislator predicted the adoption of certain regulations within 6 months from the date of the publication of the Law in "The Official Gazette of the Republic of Srpska", which has not been done.

The Rulebook on Transport and Transfer of Cash and Other Values was published in "The Official Gazette of the Republic of Srpska", on February 3, 2016, with two months of delay. The Rulebook on Resource Standard and Quality for the Application of the Basic Safety Measures was published in "The Official Gazette of the Republic of Srpska" on February 18, 2016 with a delay of more than two months. The Rulebook on Vulnerability Assessment when Handling Cash and Other Values was published in "The Official Gazette of the Republic of Srpska" on December 29, with a 15-month delay. Issues related to the application of the Law, problems arising from imprecise Rulebooks, combined with the increased control of the Ministry of the Interior concerning the application of these, have introduced a considerable confusion among law obligators, which also reflects on the people involved in the process of drafting the vulnerability assessment.

### **4. APPLICATION OF THE LAW AND RULEBOOK IN PRACTICE**

In simple words, the frivolous understanding of the importance of the Law by the adopter resulted in a delay in making the rules for up to 15 months. Such negligence also influenced

the view of most categorised entities that want to avoid the implementation of the basic security measures prescribed by the Law. When the Ministry of the Interior realised the importance of Laws and Regulations, as well as their use in practice, in the field of raising safety to a higher level by performing preventive actions with aforementioned categorised subjects, the control of those subjects began. It was found that almost all categorised entities did not have appropriate assessments, which resulted in police warning to do one within the deadline period. On average, that period lasts about six days. The activation of agencies and people meeting the conditions for dealing with the activities of vulnerability assessment identified significant deficiencies both in the Law itself and in the Rulebooks. While adopting the Law, the proposer did not seek an opinion from those who understand the problem and who can certainly give a proposal from a solution to the problem that is based on science and expertise, especially on experience. It should be noted that the proposer of the Law is not obliged to seek any opinion, but given the complexity of the application of the Law, as well as its significance, it would be useful to seek an opinion prior to the introduction of the Law to Parliamentary procedures, especially the opinion of the scientists involved in this issue.

After the adoption of the Law, the legislator did not find it appropriate, through the presentation of the Law, to introduce those Laws to the categorised subjects, as well as to those who should lead the process of making the assessment itself. The next flaw that has influenced the application of the Law is a major delay in the adoption of the Rulebook that regulates the way the Law is implemented.

Subjects who wanted to apply the Law did not exactly do that because of the lack of a Rulebook that would specify more precisely what all law obligators should do. Significant remarks relate to Article 5 of the Law, which remained undefined in the categorisation. Namely, banks with their organisational units are classified in category I and ATMs in category III. For both categories, a special vulnerability assessment is performed, which is understandable, but it is not clear what is to be done with a non-isolated ATM, which is actually within the bank. Furthermore, in Article 8 of the Law, Paragraph 3 states that “law obligators in III category are obliged to provide basic security measures in cash-handling facilities and premises...” Does this also apply to an ATM that is not in the cash-handling premises? Also, in Article 5, categorisation stipulates that microcredit organisations belong to category II. Article 8 Paragraph 2 stipulates that microcredit organisations must have anti-burglary and video surveillance systems in cash-handling premises. Most microcredit organisations do not handle cash, resulting in the fact that these security measures are not necessary. Article 8, Paragraph 2 is in collision with Article 3 of the Law in which it is clearly stated that microcredit organisations are subject to the law, it does not state whether they handle cash or not. The next uncertainty of the Law itself, which significantly affects the assessment activity, is Article 5, Paragraph 5 of the Law which states that law obligators are “legal and natural persons who handle cash and realise a daily turnover in the amount of more than 5,000 BAM”. Neither the Law nor the Rulebook indicates the time period this monetary amount refers to.

The Law stipulates that the law obligator may also apply a lower level of security measures if the Act on Vulnerability Assessment determines a lower degree of vulnerability of certain facilities and premises. What will happen if the law obligator has already applied the required security measures, and the assessment has identified a lower degree of vulnerability? Does this mean that the Law obligator does not need protection measures at all?

The Rulebook on Vulnerability Assessment when Handling Cash and Other Values, adopted on December 29, 2016, only additionally deepened the earlier doubts arising from the Law and created new ones. The six categories of protection prescribed, as well as the

quantification methodology obtained with the budget table, is applicable to law obligators from the category I, while in most other categories this is almost impossible. For easier understanding, I give the following example:

The ATM is categorised by the Law in the category III of the application of mandatory protection measures. If by quantification we come to a number 55 or higher, it is automatically the matter of a very high risk, which, among other things, in Article 17 of the Rulebook for such a quantifiers requires “physical protection with at least one control point and a connection system with members of physical security at the facility provided”<sup>5</sup>. Such quantification denies Article 8 of the Law, which states that the ATM must have continuous video surveillances and open door alarm of the treasury part of the ATMs (basic security measure).

The Rulebook specifies that assessment quantification consists of vulnerability parameter (10 factors) and security parameter (10 factors). The absence of any factor gives defective assessment quantification, i.e. the degree of vulnerability, i.e. wrong protection measures. For easier understanding, I give an example:

Microcredit organisations are placed in category II, regardless whether they handle cash or not. The prescribed methodology is not applicable to them, which ultimately can lead to a wrong recommendation on protection measure application. One of the vulnerability factors (U7) seeks answers to questions about the number of job positions that handle cash and the way of preserving that kind of money. In the offered answers there is no score that could state that the facility does not handle cash. Therefore, this factor is skipped, and a not completely acceptable score is automatically obtained.

These illogical examples are numerous in the application of Law and Rulebook, the essence related to the difficult implementation of the Law and Rulebook in practice is more important. The assessors are in an especially unenviable position, because not rarely are they exposed to pressure to consciously and deliberately interpret arbitrarily certain provisions of the Law and Rulebook, in order to provide an assessment and recommendation that will propose a lower degree of protection, or protection that does not require significant material investments by law obligators.

## **5. CONCLUSION**

By adopting the Law on Security Measures when Handling Cash and Other Values, the Republic of Srpska, for the first time, regulates the issues of physical and technical protection of entities that handle cash and other values, through the application of basic security measures. Until that moment, interested subjects were left on their own in terms of planning and organising the protection of facilities, employees and other values from different sources, forms and threats. The lack of cooperation in the process of drafting the Law among the interested subjects led to the adoption of the Law, which remained significantly incomplete and confusing. These anomalies were, adopted by the Rulebook on Vulnerability Assessment when handling cash and other values, removed to a great extent. But, in spite of that, the possibilities of dual interpretation of both the Law and the Rulebook have made the work of the assessors more difficult, as already described in this paper. It is necessary to propose in detail to the legislator a clearer definition of certain Articles of the Law, thus removing the resulting confusion, primarily in facility categorisation. Clearly defining the differences between cash-handling subjects and subjects that do not have cash or other values in their premises will clarify the confusion in

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<sup>5</sup>Rulebook published in “The Official Gazette of the Republic of Srpska”, no. 115, December 29, 2016.

the application of mandatory protection measures. It is necessary to propose to the Ministry of the Interior of the Republic of Srpska to organise the presentation of the effects of the application of the Laws and Rulebooks in practice. At the presentation, people involved in the implementation of the Law and Rulebook would have serious participation. The acquired experience would certainly have an impact on the elimination of inconsistencies in the Laws and Rulebooks, which would improve the area of protection of entities that handle cash and other values. Regardless of all the difficulties arising out of what was written, the fact that the legislator has recognised current problems arising from the unregulated area of physical and technical protection is encouraging.

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## THE HUMAN RESOURCES IN THE CIVIL DEFENSE SYSTEM

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**Abstract:** *Intensive technological development, accompanied by the modernization of all social areas and the emergence of new scientific disciplines, contributes parallel to the creation of greater simplicity in carrying out everyday activities, but also confirms the inability to completely replace human potential. Security, more than ever before, is threatened by modern asymmetric threats, which, largely complementing traditional threats, make humanity more difficult and complicates the task of preserving and establishing peace and stability. In order to prevent and respond adequately in a diverse and unpredictable environment, states, all systems, but also every individual must, in addition to having adequate resources, have elementary knowledge and skills to help them achieve defense, protection and rescue in crisis situations as effectively as possible. The importance of interoperability of all human resources, as well as inevitability of a multidisciplinary approach to security, are recognized in civilian military cooperation, which is essential in carrying out joint tasks in the field of security and defense.*

**Key words:** *human resources, civilian military cooperation, defense system, civil defense, the subjects of importance for the defense*

### 1. INTRODUCTION

The history of mankind is reflected in the ability to find solutions for many critical situations, facilitating everyday life through the invention and creating conditions for a certain future. As parallel with the stages of the development of science in the function of the well-being of the entire society, the factors that create unsafe situations are compounded, human resources are always again before testing and upgrading their knowledge and skills in order to avoid unwanted circumstances in the future. Security forces are no longer just military and police, that is, they are complemented by modern professions, because it is necessary to respond to new challenges, risks and threats to security.

The defense system itself is a specific organizational structure, the capabilities of which are best verified by extreme situations. Although in everyday conditions it is necessary to plan, arrange and check readiness for performing tasks in an emergency and war situation, the compatibility and harmonization of human resources can bring much more results than individual operation.

Human resource analyzes have come from the aspect of their skills, knowledge, skills, and above all awareness of the need to defend the basic values and interests of the society. Coordination of human resources in the defense system is important for the functioning of security and defense structures, but also for the establishment of civil-military cooperation, as well as the effective functioning of civil defense - a part of the defense that, due to its compatibility with the military component, significantly contributes to the stability of one country, the presence of different professions strengthens the scope and quality of human resources of the defense system.

## **2. HUMAN RESOURCES AS A FACTOR OF SECURITY**

Human resources are the subject of the study of many sciences and scientific disciplines, from philosophy, sociology, psychology, economics, statistics, to various types of management as a subown of the science of organization and management. For the purpose of analyzing and explaining human resources as a security factor, extensive research can be undertaken to confirm existing theoretical considerations or find new knowledge. However, it is important to recognize the ways in which individuals or a majority of a country can contribute to deter potential threats to security and maintain stability.

In the context of the defense, human resources imply demographic potential that is subject to defense obligations and is capable and trained to engage in a defense system [8]. In accordance with strategic commitments, the state of human resources is of vital importance for the defense and protection of defense interests, conflict prevention and crisis, the preservation of peace and stability in the region and the world.

The extent of human resources devoted to the defense system inevitably depends on the developed level of awareness about the defense of the vital values of society, the level of security culture, knowledge, skills, abilities, motivation, sense of responsibility, as well as the normative and legal arrangement of the obligations of each individual. As some authors point out, the role of human resources in securing the required level of interoperability (organizational and semantic) is reflected primarily in the level of competence, quality of coverage and planned and adequate use [3]. Also, the human factor is also defined as the quality of a set of essential characteristics of people that relate to the meaning of their actions or commitment to acting in the field of the joint activity of security in peace and war. Under the human security factor (and defense in war), the following is assumed:

1. Engagement of the population (quantity of human factor),
2. Organization for the needs of the defense (defense conditions),
3. International support (general circumstances of the defense - the media),
4. Alliances (help from allies and friends),
5. Freedom-survival and defense (the moment of defense),
6. Ethics of defense (quality of personality and defense),
7. Morality of defense (quality of human collectives and defense),
8. Traditions of defense (quality of society-nation and defense) [5].

If we exclude the demographic picture of a state, the next factor that almost decisively affects the state of human resources for defense needs is education. The education of the population in the context of security and defense creates awareness of the dangers that can directly endanger one, and indirectly leave far-reaching consequences. Security is indivisible, which implies that the functioning of a particular social area can not be considered less important than the functioning of structures in the domain of security, defense and protection. Understanding the implications of the defense system can create a disturbed functioning of areas such as medicine, pharmacy, veterinary, agriculture, water management, energy, information technology, traffic, trade, economics and others. It confirms the view that the armed forces can not solely independently and independently respond to contemporary forms it is necessary to create and encourage the coordination of the work of primarily professional teams from each area. The ideal organization of knowledge is where people and organizations exchange knowledge through functional business areas, using technology and already established processes for exchanging ideas and knowledge for policy and strategy design [3].

When evaluating the quality of the human factor, it is necessary to respect the changing conditions and circumstances in which it is monitored, evaluated and assessed in its entirety with other factors, which are: quantitative indicators of the interrelation of the human factor with the material-technical factor, space and time; the organization and functioning of the

national security and defense system; an objective assessment of possible forms and methods of threatening the state and society; the current quality of a potential or accomplished alliance, and international and domestic public opinion regarding the security of the nation [5]. In order to be able to respond in every way to the defense system, resources should not be allowed to stagnate in their development, as well as insufficient commitment to maintenance and improvement. Investing in human resources protects defense interests, and significantly contributes to prevention from endangering peace and stability.

### **3. COORDINATING THE WORK OF MILITARY AND CIVILIAN STRUCTURES IN THE DEFENSE SYSTEM**

Independent implementation of tasks by the armed forces of any country without regard to civil structures is increasingly rare. In the process of gathering information, making decisions, logistical preparation for the realization of tasks, as well as concrete work on the ground, it is inevitable to rely on military structures on the capacities of almost all areas of the operation of one society. The armies are primarily intended to defend the country from armed threats from the outside, to participate in armed operations outside its own territory in case of endangering national values and interests or support in the building and preservation of peace in the region and the world, but also for helping the population in the process of establishing a violated order. The complexity of ensuring the functioning of the armed forces and the efficient implementation of tasks on the path of peace and stability create a strong interdependence between the civil and military sectors.

The Army of the Republic of Serbia is an organized armed force that defends the Republic of Serbia against armed extermination from outside and performs other missions and tasks in accordance with the Constitution, the law and principles of international law regulating the use of force [9]. In terms of human resources, the Serbian Armed Forces consists of:

a) continuous composition

- professional members (military personnel and civilian personnel serving in the Army of Serbia) and
- soldiers serving military service

b) reserve

- reserve officers, reserve inspectors and soldiers in the active reserve and
- reserve officers, reserve inspectors and soldiers in the passive reserve.

Unlike most of the armed forces of developed countries that apply civil-military cooperation only in multinational operations, the Serbian Armed Forces defined the function of civil-military co-operation for their implementation in all three missions, defined by the Defense Strategy of the Republic of Serbia. This means that the function does not only concern activities during participation in the building and preservation of peace in the region and the world, but also on the activities of civil-military cooperation in the service of the state's defense against armed threats from the outside, as well as on the activities of supporting the civilian authorities in countering the threats to security [10].

The Civil-Military Cooperation (CIMIC) is to establish links between military and civilian representatives at a certain level and space in order to contribute to the attainment of primarily military and common interests through mutually supported activities [4].

Developed countries tie civil-military cooperation to peacekeeping missions, while civil-military co-operation is necessary for developing countries and countries with unstable political structures in order to resolve internal conflicts without removing the impacts of dangerous populations, critical infrastructure and the environment. Today's peacekeeping operations carry with them a large number of problems related to civilians and include:

- the appearance of internally displaced persons and the problem of their care;

- damaged infrastructure (power stations, water supply, communication centers);
- lack of basic functions of local self-government (functioning of public order and peace, supply system - food, fuel, public transport system, education, health care ...);
- the presence of a large number of different governmental and non-governmental organizations with different purposes and modes of operation; and
- failure to respect the system of legal norms and laws [4].

In the 21st century, the Serbian Armed Forces supported a mission to support civilian authorities in countering threats to security, primarily by engaging in emergency situations, when the capacities of civilian structures were not adequate and sufficient to respond.

The significance of civil-military cooperation over time is becoming more and more important, primarily due to the effects achieved by this kind of interdependence. Investing in the human and material capacities of civil-military cooperation, as well as finding the most efficient coordination of the work of the said structures is of great importance in preventive action, as well as intervening due to the emergence of a danger to the safety of citizens. High-quality establishment and development of civil-military cooperation is significantly contributed by intensive training, exchange of experience with other security entities from the country and abroad, as well as the development of specific and contemporary functions.

Due to the fact that civil-military cooperation in some countries is a young function of the military, mutual support and understanding of the necessity of its existence is necessary, as well as a compatible orientation of both military and civilian forces towards achieving the goals. The ultimate goals relate to achieving real benefits for the unit, increasing the security of their own forces, and building trust between the army and the civilian population [4].

Initiators of civil-military cooperation can be factors from the civil environment, but also military structures, whereby it is important that each factor keeps its own autonomy in the coordination of joint work.

#### **4. HUMAN RESOURCES IN OTHER SUBJECTS OF IMPORTANCE FOR THE DEFENSE**

The Army of the Republic of Serbia is the main subject of the defense system, which is primarily aimed at protecting the state from external aggression. However, the emergence of many security hazards tests the capability of the armed forces, above all the military, and confirms the importance of security and defense awareness in other subjects of importance for the defense.

In the countries defined for the concept of total defense, there is a civil defense against the military defense. When it comes to civil defense, it is evident that this is a neglected area or in modern conditions incorporated into new terms. As achievement of the 20th century, civil defense was observed or exclusively as a defensive function with the aim of supporting national military defense, or as a measure of protection against nuclear disasters that should enable survival, or be completely directed to protection against natural disasters, whereby identifies with civil protection [2]. The modern concept of civil defense has emerged, driven by Hobs's idea that the state is obliged to provide security to its citizens [6]. In this context, the Republic of Serbia realizes civil defense missions in the following ways:

- providing presumptions for the functioning of the defense system through the preparation of state bodies, state administration bodies, autonomous province authorities, local self-government units, companies and other legal entities for peacekeeping in both the state of war and emergency, ensuring conditions for the life

- and work of citizens in peace both in war and in emergency; education and defense of citizens and coordination of activities with other institutions important for defense;
- protection and rescue, which means observation and informing, protecting and saving people, protecting and depositing material goods and preserving the environment, realized by the forces of civil protection and, if necessary, units of the Serbian Armed Forces;
  - participation in international protection and rescue operations based on international and bilateral agreements and treaties, as well as in line with the need to eliminate the consequences of natural and technical and technological disasters [8].

The whole society contributes in a variety of ways to the state of security and defense. Human activity in almost all areas necessary for the survival of a community, such as medicine, education, information technology, economics, trade, telecommunications, transport, energy and others, can be directed towards the achievement of preventive goals, but also towards the establishment of an optimal level of functioning of its activity due to the emergence of dangers that have consequences for vital values and interests.

Civil defense in the Republic of Serbia is realized through other subjects of importance for the defense. Other subjects of importance for defense are institutions dealing with diplomacy, security, economy, education, health, science and information, as well as legal entities whose activity contributes to the functioning of the defense system [8]. Based on strategic choices due to the emergence of security challenges, risks and threats, it is important that civil society structures direct their resources to eliminate the causes of disrupting defense potentials and to remedy the resulting harmful effects.

The modern world (post-industrial, technological, informational, global) requires trained, ready and capable people who use new complex tools, quickly and efficiently adopt, develop and apply diverse knowledge, participate actively and responsibly in complex social and economic relations and processes in daily life and bring adequate, rational and best decisions [1]. In carrying out tasks in the field of civil defense, it is possible to engage entire working-age population within state bodies, large technical systems, legal entities, voluntary associations and other organizations. However, the success of the functioning of civil defense and coordination of human resources in emergency situation, a state of emergency and war depends on the developed level of awareness of security and defense. Due to the recognition of all spheres of human activity as significant carriers of certain segments of security, the question arises as to how well they are aware of the responsibilities of security and defense, that is, knowledge about the contribution of security and defense through preventive action.

The most important current determinants of the potential education system in civil defense are: political organization of the country; the international military-political situation and the position of the country in the world; physiognomy of modern war and other forms of endangering the safety and vital values of the society in peace and emergency situations; the concept and the doctrine of functioning of civil defense in the war, as well as defense and protection in other emergency situations; scientific, technical and technological changes and achievements in the world, and especially changes and scientific and technological achievements in the development of war skills; and the place and role of citizens in a contemporary democratic society and, in particular, in the defense and protection system [2]. The higher quantum of knowledge at the individual level, as well as at the community level, is related to the progress, progress and strengthening of individual, group and collective abilities. Education affects an individual by: increasing knowledge about things and people around him, about the whole world, and about the opportunities provided by getting to know each other; increases faith in one's own power and the ability to efficiently carry out the tasks imposed by life [7].

Human resources, as factors of the civil defense concept, with their knowledge, capabilities and skills preventively contribute to the preservation of peace, ie deterring the aggressors, while in the process of the danger of action, they direct their efforts towards the elimination of destructive consequences. Creating human resources that are adequate for the concept of civil defense largely depends on the security culture. Security culture is in the right sense of the word, the basic element of the survival of a society because it contains all the creative activities of a nation (from the way of production, form of organization, belief, to goals and resources) [7].

Despite inevitable modifications, the goal of civil defense is always the same, the protection of people, critical infrastructure, historical and cultural monuments, and the environment. In most countries, the view is that the army, as a specific organization, needs to undo everything that can be done in civil society [2]. The concept of civil defense is definitely a state function, which has implications and needs to delegate responsibilities across levels of governance to an individual [6]. In order to create an advanced and secure society as such a concept of civil defense, it is necessary that the state, by its mechanisms and measures, approaches security and defense to every individual, that is, almost the entire population makes human resources capable of preserving or establishing a defense.

## 5. CONCLUSION

It is evident that the entire population of each country represents a defense resource, or at the same time represents a resource whose priority is a priority and a resource that depends on the state of establishment, maintenance and improvement of security. By analyzing the emergence and development of civil defense, it is necessary to look at all the facts that have effectively contributed to the realization of defense and the protection of the civilian population. Also, civil defense, as a part that exists parallel to military defense, needs to be in line with modern security conditions and as effectively as contributing to the preservation and achievement of the stability of a country.

Due to the question of the visibility and necessity of the civil defense system in one society, the founders of the civil defense system are the starting point for finding answers. Human resources constitute a key factor in civil defense and inevitably include the majority of the inhabitants of a country that contributes to the achievement of security and defense by unarmed action.

Civilian and military sectors can not survive in isolation from each other. Successful coordination of human resources work in the overall defense system reflects the strength of the interdependence between the civil and military segments.

The structures of national security and defense know best the complexity of security problems, while on the other hand, in the case of the civilian population, the defense is not the subject of everyday interest, until the disturbance occurs. The developed security culture and awareness of the need for defense of the country make the entire population human resources, confirming the importance of all areas of human action in the context of creating a secure society.

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## INTERNATIONAL SOURCES OF LAW PROTECTION OF REFUGEES

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***Abstract:** The culmination of the migrant crisis in 2015, proved weaknesses as part of international and national legislation regulating the migration of the population, especially the part related to the protection of refugees as a specific category of migrants. Migrant crisis directly affected the necessity of redefining the existing strategic and doctrinal documents of the Republic of Serbia, according to a security trends in the region and the world. The paper presents historical genesis of legal documents at international level that regulates standards in dealing with refugees, but also the fundamental rights of refugees, as well as the obligations of States that have their refuge.*

***Keywords:** migration, refugees, law documents.*

### 1. INTRODUCTION

After the horrors experienced during the two world wars, and the establishment of the United Nations, an organization whose primary purpose is the construction and preservation of world peace, the general opinion is that humanity „wised up" and finally went through „respecting the principles of peaceful coexistence." However, we are still witnessing a permanent threat to the fundamental rights to peace, freedom and protection of every form of integrity, and sovereignty of individual states. It seems that all the efforts of the modern world in terms of raising the level of international respect, tolerance and the spread of human solidarity was in vain. „People in movement" as a leading geopolitician called migration of the population of some countries of North Africa and the Middle East, this claim proves best.[3]

„Top wave " of migrant crisis that hit the European continent was in 2015, since then the number of migrants is drastically reduced, but the repercussions of this crisis on the socio-political systems of the countries of Europe today feel. The issue of accepting migrants or refugees leads to tensions and divisions not only at the level of the international community, but also within the European Union (EU). Based on data Frontex (European Agency responsible for European border and coast guard) in the **period from 2014 to 2018**, about **1.8 million** people have migrated to the EU, but this figure only applies to asylum seekers and refugees or people who have entered the EU using regular migration procedures.

In light of the migrant crisis indirectly came to the fore shortcomings of the existing international legal documents which regulate the rights and protection of migrants and refugees as a narrower concept. This applies in particular to the legal status of refugees and the obligations of states that have their refuge. Consequently came to the fore the deficiencies in the legislative documents of the state.

In order to better understand the problems of international legal documents that are the basis for understanding the rights and responsibilities of migrants and refugees, but also the necessity of organization of legislative national documents related to the protection of refugees, the work is divided into two parts, namely: the first is the emphasis given to contemporary international sources of legislative protection of the rights of refugees with regard to the legislation of the Republic of Serbia (RS), a second part of the focus is placed on EU legislation which regulated this area.

## **2. INTERNATIONAL DOCUMENTS FOR THE PROTECTION OF REFUGEES**

The essence of all international regulations which regulates the rights of refugees is an international public law, a special segment of international humanitarian law or the „law of war". In the theory of law there is no consensus about the origin of the laws of war, but all viewpoint can be classified into three major groups, namely: (1) the law of war was formed several centuries BC, that is, its genesis can be traced back to ancient times; (2) The law of war is unwritten or customary law that has developed during the Middle Ages in Europe, and (3) of the law of war arises adoption of the First Geneva Convention for the Amelioration of the Wounded fate in 1864.

The accuracy of the viewpoint depends ultimately on how to understand international humanitarian law. If it is viewed in the modern sense as one and built a complete system in which the prevailing rules codified or written legal documents, the real beginning of international humanitarian law is the second half of the 19th century. However, if one wants to follow the development of humanitarian law from the onset of its usual rules and institutions, then it is very old in its origin, and its origin extends to several millennia BC. In any case, modern international humanitarian law was created in the mid-19th century, but its roots must be sought in the distant past. [2]

Among the documents that are most improved international humanitarian law must be allocated as follows: The United Nations Charter and the Universal Declaration of Human Rights (adopted on 10.12.1948. Year). After the adoption of these documents and the ratification of almost all countries of the world has created the basis for further improvement of national legislation in this area. However, for this study we have selected a number of international regulations that further and more detailed governing protection of refugees, and closely related to international public law. It is important to point out that we in this part of the paper and gave short presentation of normative-legal framework of the RS in relation to this issue.

At the international level, the most important legal documents regulating standards in dealing with refugees, determines their basic rights and obligations of States occupies a special place in the **Geneva Convention on the Status of Refugees (the Convention)**, adopted by the United Nations (UN) in 1951 and entered into force on 22.04.1954. years. By the end of 2017, the Convention has been ratified by 148 countries. The Convention was adopted after end of the Second World War and was made in order to rectify the consequences of the scourge of war and to help internally displaced persons worldwide. Based on the principle that no country should return a refugee to a country where his life could be in danger. The Convention obliges states to provide asylum and protection to those who are facing persecution based on religious, political, racial or national opinion. According to the Convention are considered to be refugees person worthy of human dignity, and they should be helpful, but if necessary and protect the cause of eviction. [4]

Bearing in mind that the Convention covers only those persons who have become refugees as a result of events that took place before 01.01.1951., that after the adoption of this

Convention performed certain events that brought about the emergence of new refugees, as well as the requirement to provide equal protection and treatment to all refugees, the need for the adoption of such a document which will replace the lack of the Convention itself. This Convention was redefined by resolution 2198 of the UN General Assembly 16.12.1966. by which it adopted the **Protocol relating to the Status of Refugees (Protocol)**. The said Protocol entered into force on 04.10.1967. The protocol is enabled wider application of the Convention, since removed its time limit and demographically. Conventions and protocols constitute the essence of the legal framework for protection and identification of refugee international standard for the treatment of refugee. The behavior of the state in accordance with the Convention and the Protocol oversees the Office of the High Commissioner for Refugees. [5]

States have the power to decide who to accept as immigrants, but when it comes to refugee movements or involuntary, there are limits on government power in the form of the obligations imposed on them by the Convention. Here it is necessary to distinguish and identify persons who really need the help and protection of persons who participate and are part of extremist ideologies and terrorist groups that pose a threat to the security of the states that harbor them. Analyzing the current situation, but also all potential situations in the coming period, it is necessary to point out that the longer retention of such persons on the territory of RS could destabilize the peace and security of our citizens. [1]

Before this „migrant crisis" RS and other countries in the region are not considered migration policy and asylum important political priority. Therefore, the procedures related to migration and asylum in the Republic of Slovenia and the region is very young, and now is the time to open the debate on migration policy in the Western Balkans and the EU, particularly in the context of integration into the EU, due to the reforms and a more comprehensive approach to this issue. [2]

Normative-legal framework regarding migration of population in RS is mostly compliant with the normative and legal regulations of the EU (EU accession RS „the permanent strategic orientation" of the authorities in RS from 2000 to date). However, the legal framework in this area until 2007, practically did not exist. In fact, until 2010, was considered the Refugee Act of 1992 (Official Gazette of RS, no. 18/92), which was twice amended and supplemented (Official Gazette of FRY, no. 42/2002 and Official Gazette of RS, no. 45/2002), and finally in 2010 adopted the Law on amendments to the Law on refugees (Official Gazette of RS, no. 30/2010), which is still topical. However, this law does not correspond to the current situation on the ground, primarily because the term refugees geographically and spatially restricted to persons from the former Yugoslavia and the FRY and for the period from 1991 to 1998.

Asylum Act (Official Gazette of RS, no. 109/07) was adopted in accordance with the guidelines of the EU and there are precisely defined conditions and the process of obtaining asylum in the RS, but not the law does not fully reflect the situation on the ground, and he changes and amendments made in late 2016. Otherwise, a very small number of migrants and refugees residing in the territory of the Republic decides to seek asylum, as in other cases with other transit countries in the region. It is obvious that RS and its neighbors just a stopover migrants and refugees on the way to the most developed EU countries (France and Germany).

Government adopted in 2009 the Strategy for Combating Illegal Migration for 2009-2014., which was a precondition for the classification of the Republic of Slovenia to the list of positive EU visa regime. National strategy for resolving the issues of refugees and internally displaced persons for the period 2015-2020. was adopted 10.07.2015. (Official Gazette of RS, no. 019/15), whose strategic and specific objectives determined temporally and geographically in terms of refugees. In addition to these documents, in 2012 adopted the

Law on Migration Management (Official Gazette of RS, no. 107/12) that actually complements all previous documents. For example, the Law on Refugees was amended by the Law on the management of migration, because this law introduces an institutional framework for addressing not only refugees but also migrants - are introduced: Commissariat for Refugees and Migrants (by then there was only Commissioner for Refugees) as well as local councils for migration at the level of local self-government and autonomous regions. Also, this law was first regulated and unified system for collecting, organizing and sharing data on refugees and migrants, as well as cooperation with the countries of the region and the EU on this issue.

In accordance with the security threat which proved as a migrant crisis, it is evident that the RS security strategic and doctrinal documents should be redefined. New strategic and doctrinal documents RS is currently in the process of public consultation and is expected to adopt them by the end of 2018. It had already made major EU countries, the Federal Republic of Germany in July 2016, revealed „White Paper on German Security Policy and the future of the German armed forces“, which stresses „hybrid war“ as the first on the list of security challenges, risks and threats , according to the migration of the population as well as one of its manifestations. The French Republic in 2013 adopted a new „Defense White Paper“ which explicitly states that the security of the European countries of significance everything that happens on the African coast of the Mediterranean, in the Sahel and the Middle East (in the context „Arab Spring“ and the civil war in Syria, and its consequences).

### **3. REGULATIONS OF THE EUROPEAN UNION FOR THE PROTECTION OF REFUGEES**

All EU regulations on the protection of refugees based on the Convention and the Protocol, but also to internal EU documents that are the product of years of existence, Union, as one of the largest, but also the richest Confederation in the history of mankind. This primarily refers to the Treaty establishing the EU and the opinions of certain committees of the EU such as the Committee of Regions and the Committee for Economic and Social Affairs.

In a number of documents on the (non) indirectly deal with the protection of refugees in the EU, there are three, namely: (1) *Council Directive EU 2003/09/EC on minimum conditions for the reception of asylum seekers in Member States*; (2) *Council Directive No. 2004/83 / EC on minimum standards for the qualification and status, of third-country nationals, and* (3) *Council Directive 2005/85 / EC on minimum standards for procedures in Member States for granting and withdrawing refugee status*. These directives are the starting and binding basis for the regulation of these issues in all EU Member States through their own legal system. In the following paper we present only the common characteristics of those directives, as it is primarily due to the volume of work we can't deal with the specificity that has each of the directives.

Common features of the Directive can be divided into two groups: (a) those related to institutions and documents on which to base the directive and (b) the rights and protection of persons. In the context of the institution and the background documents directives have in common is the following: (1) policies on asylum, including a Common European Asylum System; (2) adherence to the guidelines adopted at the special meeting of the European Council in Tampere 15-16.10.1999., where it was agreed that all EU institutions working on inclusive implementation of the Convention and the Protocol and which confirmed the principle of non-refoulement and expulsion and making sure that no one is returned to where it will be exposed to persecution; (3) coordination of minimum standards with respect to the methods in the member states for administering or withdrawing refugee status, or that this is the first measure when it comes to asylum procedures, and (4) the

application of the Directive should be evaluated at regular time period which must not be longer than two years.

In terms of protecting the rights of persons allocated the following characteristics: (1) persons in need of protection as refugees, in accordance with Article 1 of the Convention should, with some exceptions, have an effective access to procedures, the opportunity to cooperate and properly communicate with the competent authorities for the purpose of presenting the facts relevant to his case. Also, the above-mentioned persons, based on the procedure for examining asylum applications, usually need to get at least the right to stay in the country pending a decision by the deciding authority, access to the services of an interpreter to put forward their case if they were questioned by the authorities, the possibility to get in touch with a representative of the UN High Commissioner for Refugees, or any organization acting on their behalf, the right to adequate notice of the decision, the facts and the legal reasoning of the decision, the opportunity to consult with legal counsel or adviser from another authorities, as well as the right to be informed of their legal position at decisive moments during the procedure, in a language that can be reasonably assumed to be understood.

(2) should be determined and specific procedural guarantees for unaccompanied minors because of their vulnerability, and the Member States, in this context, should be guided primarily the best interest of the child; (3) is a key factor in determining the merits of a request for recognition of refugee status is the safety of the applicant in his country of origin or a third country can be considered a safe country of origin when Member States are able to is designated as a safe and assume that is safe for a particular applicant, unless he brought out serious counter-arguments that it is not so; (4) Member States are required to establish common criteria for the determination of safe countries.

(5) Elimination or cessation of refugee status, Member States should ensure that persons enjoying refugee status are in the prescribed manner informed of a possible reconsideration of their status and have the opportunity to present their point of view before the authorities make a reasoned decision to abolish them refugee status. However, it should grant a derogation from these guarantees when the reasons for the cessation of refugee status is not related to the changing conditions on which the recognition was based.

#### **4. CONCLUSION**

The demographic imbalance between rich and poor will result in a wave of migration to each other, and present a disturbing social and racial reactions may be small compared with what is happening in the world with eight or ten billion people. What characterizes the modern migration is reflected primarily in the fact that they represent a unique source of mobile security challenges, risks and threats to the host countries and for the transit countries. However, under international humanitarian law (as the basis of universal rights), and all documents that have emerged from it and which it simultaneously amended, to protect human rights and human life as the highest value. In these documents, special attention was paid to the protection of refugees, or persons because of the risk of personal integrity and dignity had to leave their country and seek salvation in the other. An important feature of international humanitarian law as a source of refugee protection is reflected in his' constant redefinition in line with changes in international relations. In fact, in contemporary international relations, all this has led to diametrically opposed views on refugee protection, and the best example of this is the situation in the EU on this and similar issues.

Increase in cost national-populist idea, EU member states found themselves before a special challenge: How to accommodate asylum seekers awaiting a decision on their case, how to integrate them into the economy and society if their request is approved and to deport them if the answer is negative. The desire of European governments is to reduce migration,

because they are absolutely aware that migration can't be completely stopped, except in the case of European countries give up and/or redefine existing international legislative solutions. In other words „Europe" should abandon the existing law on asylum, which is implemented in all the international conventions adopted after the Second World War. One of the direct consequences of the migrant crisis in Europe is the emergence „ideological war", which utterly transforms any existing base of leading contemporary liberal democracies, and these changes apply to the national and international legislative solutions that were eventually proven to be outdated and inefficient (document are made at the end of the 70s of the 20th century).

Based on the above findings, we conclude that the migrant crisis of 2015 demonstrated the weakness of the socio-political organization of European countries, but also the necessity of redefining the existing international legal documents regulating the protection of refugees. Legislation of the RS in the period from 2015 to 2018, took a big step forward in terms of legal regulation of migration of the population, primarily in connection with the protection of the rights of refugees, but also understanding of migration as one of the threats to the national security system RS.

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## APPLICATION OF GIS IN CRISIS SITUATION – ARMY AND CRISIS RESPONSE

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**ABSTRACT:** *Information in 21<sup>st</sup> century represents power, and with that, safest and most legitimate "machine for dominating". Consequences from the rapid growth of information technologies and their usage for solving of crisis situation make information one of the key concepts of the unconventional warfare. Application of GIS (Geographical Information System) in the Army and crisis response for getting information is wide used all over the world, but this paper gives an overview and make particular ideas for further development in usage of GIS for geo-reconnaissance and dialling with crisis. The main aim is getting specific information about objects, buildings and devices on the affected area through geo-location and plots field data (various digital, video images), further management and planning strategies for ensuring proper security, and also in other way, getting information from the intelligence services for planning routes of movement, all that based on the information from the GIS. Geographic information system is recognized as a useful system for alleviation of the risk during the crisis management we develop the idea to promote a new model to have a practical and applicable method of GIS adoption within the crisis management in order to save as many lives as it can be done military reconnaissance, helping in the military decision making process.*

*In this paper, despite the overview of GIS usage for geo-reconnaissance in army and crisis response, is presented an application for the soldiers and crisis teams on the ground for live streaming (drones and video camera) and live processing of the decisions from their commands, getting real time track log with moving map (through a GPS signal), which displays their current coordinate location, and their heading directions given by their crisis headquarters.*

**Key words:** *GIS, army, geo-reconnaissance, crisis management, decision.*

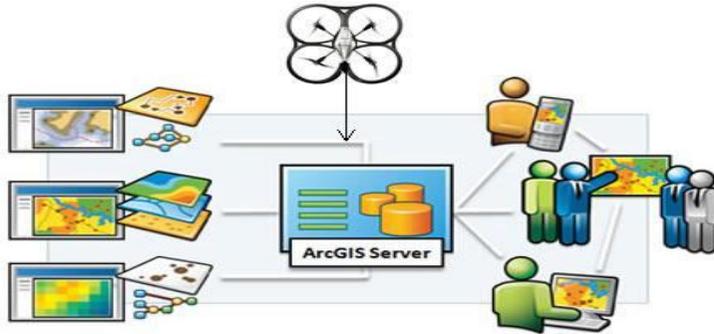
### 1. INTRODUCTION

The right information and the use of advanced technologies are big lifesaving tool on the ground. If commanders and commandants have right information about the affected area of crises (position, number, equipment etc) they can make better decisions respectively which unit to use, how much soldiers to send to finished the task, which one position will be the most effective in executing the mission, which soldier to select to finish the mission. Most of security decisions connected with national involve geography – whether it's strategic purpose for solving current crises situation in which it's involved the army. GIS technology plays a critical role in modern defense and intelligence systems as an increasingly omnipresent spatial information and application infrastructure. GIS has a long history of driving environmental understanding and decision making. Policymakers, planners, scientists, and many others worldwide rely on GIS for data management and scientific analysis. GIS users represent a vast reservoir of knowledge, expertise, and best

practices in applying this cornerstone technology to crises management, carbon management, renewable energy, sustainability, and disaster management. Operations have become more and more complex due to the use of different platforms, sensors, and systems during the crises situation. Our forces and our allies need to tailor their crises management systems to integrate data from a variety of platforms and sensors, offering customers the tactical clarity and confidence essential to operational success. These systems also need to deal with command and control, communications and information management problems. A modular software approach needs to deliver secure, reliable communications for network-centric operations at every tier. For holistic crises management, our application need to provides all the tools needed to support planning and execution of operations, including terrain analysis, route management and global distribution of tactical and operational information.[1] This is what GIS is about: to display special kind of information about specific area with unlimited amount of essential mapping information (layers), used to display the knowledge base of that area. When crises happens alter the world around us, high-quality data must be collected and examined to accurately assess the damage and plan restoration efforts. Rapid response and attention to detail are both of the utmost importance. Through the use of mobile GIS, these often-opposing objectives can be achieved simultaneously. Operating PDAs equipped with Arc Pad and GPS, trained field personnel can take advantage of custom forms and other time-saving data entry features that render obsolete the use of pen, pad, and paper map. Upon return to the office, field data is integrated into the project geodatabase with no additional data entry needed, allowing more time to analyze the data and develop maps and reports.[2]

## **2. GIS IN CRISIS SITUATION – ARMY AND CRISIS RESPONSE**

GIS is widely used in almost all the branches of the modern armies. Capabilities that use GIS are following: Command and Control, Defense mapping organizations, Base operations and facility management, Force protection and security, Military engineering, Mine clearance and mapping, Mission planning, Terrain analysis etc.[3] The term reconnaissance means preliminary observation or research of a specific field for a mission to obtain information about the crisis situation or to locate it. Geo-reconnaissance determine specific type of information gathered from the visual observation or other detection methods, which give us information's about the terrain, geographical elements of it, objects on that specific area, that can help us to create a better picture for the situation and the resources they are using to solve crisis on it. [4] So, one of the ways of data gathering is by aerial photographs and space images. Advantage of these kind of collecting data is the possibility of gaining information without getting any contact with the earth surface directly, but with contacting a mediatory unit carrying information about the surface. As that kind of mediatory unit which carry an assessing equipment to gain information are today's popular unmanned aerial vehicle (UAC) commonly known as a drone. With a proper equipment they can be used to observe and make a live photographs of the terrain of interest which is part of crisis area. This method will reduce the usage of people risking their life for the purpose of collecting information.



**Image 1: GIS Cloud mapping with UAV**

From this point, knowing the terrain and selecting the required layers, commanding unit from Tactical Operation Center (TOC) can create and plan routes of movement. C4IRSNet defines a Command, Control, Communication, Computer, Information, Reconnaissance, Surveillance and Network. The Arc-GIS platform is an enterprise information technology infrastructure, and as such, provides a horizontal, crosscutting technology that is very different from GIS technologies past niche usage [5]. One concept made a big step up in the usage of GIS for military purposes, especially military affairs. That is NCO which represents concept of Network-Centric Operations i.e. the use of the network to connect decision making across multiple defense domains and beyond. The development of military commanding and management technique systems seen in recent years has been made possible primarily by the development of microelectronics, the rapid decrease in size of IT tools, the enormous increase of their capacity, and the integration of their capabilities into a single system. This is applied by maneuvering robot aircrafts, unmanned flying devices and by all other armament managing, deployment managing systems, which are, on the one hand in an interactive contact with the environment, and direct interactively the given object, on the other [5].

### **3. INFORMATION SYSTEM – GEO\_RECONNAISSANCE AND COMMANDING**

Composing two previous GIS concepts into one model of information system is the main idea of this paper. Creating an appropriate application for portable devices based on the model of the information system will ease the usage of these complex concepts. The Geo-reconnaissance and commanding (GRC) information system is based on the GIS usage for both Geo-reconnaissance and C4IRSNet - Command, Control, Communication, Computer, Information, Reconnaissance, Surveillance and Network. So through the wide utilization of GIS we want to create one completely defined information system which will help soldiers, commanders and strategic decision makers, for easily observation of their current situation, their future actions and of course after the end of the mission, feedback and analyzing of the mistakes and creating directions for further improvement.

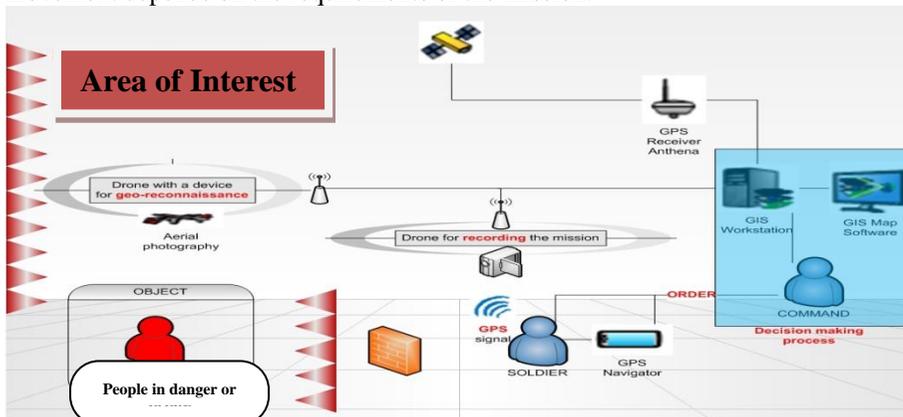
1<sup>st</sup> step into creating of this kind of complex system is equipping the direct participants i.e. soldiers with proper equipment for geo\_locating, and that will be an emitter which will constantly send signals. The receiving device, because sometimes the terrain is not accessible for all kinds of vehicles, will be set on the drone and it will forward the signals to commander. The device set on this drone also will be in a role as an emitter, so it will sent various kind of signals to the soldiers on the ground or area of interest.

2<sup>nd</sup> step is receiving the information about the location of the unit and the soldiers in the commanding unit. In this unit, the commander with the help of the staff (headquarters) based on the locations of the soldiers shown on the monitor using GIS software (Arc-GIS and Geo-Rover), decides what actions will be taken. In this section, biggest impact on the functioning of the information system has GIS usage for C4IRNet, described already in the previous topic. Arc-GIS capabilities help in the *decision making process*, giving to commanding unit various kind of information, from situational picture on the ground, to decisions made by other commanders, visualization of unit deployment, reports, and of course information received from the geo-reconnaissance.

*Geo-reconnaissance* actually is the parallel step to the geo-location step. Geo-reconnaissance, in fact is the major element of this information system. With aerial photography, infrared sensors, space images, the command gets data and information about the situation on the territory, about the people in danger, objects in the deep of the crisis line, fortification obstacles, and other information that can be beneficial later in the decision making process.

Geo-locating and Geo-reconnaissance give the input values in the information system. Than human factor, make a decision, which represent an output from the system. This output can be in a form: directions about the movement, usage of equipment, withdrawal, locations of people in danger ect. The orders from TOC are transferred to lower instances, and at the end every soldier has a specific task to finish. If the "output" represents specific directions about the movement, that order via GPS is shown on the GPS navigator which is a part of the equipment of every soldier. In this direction we go step forward where every soldier/citizen is an receiver and emitter of the current situation on the ground which will transfer it throw technical equipment (mobile phones, radio link, net link ect.) to TOC in command of HQ.

As an integrated part of the information system is the *recording and live streaming* section. A camera is set on the drone above the ground, so it records the real action. The video is transferred to the command, which can help to make a better decision, if the information received from other sources (geo-reconnaissance, geo-location, radio devices). Also the video material can be used later for analyzing the mission or the battle. Drones are controlled from the command in TOC, and their location and movement depends on the requirements of the mission.



**Image 2:** Model of Geo-reconnaissance and commanding (GRC) information system

The second model *named distance model* is more complex and its without UAV, the position of the soldier is send via the VHF military radio from the built-in GPS. The distance and the angle to the target is determinate by the two team members using Laser

Rangefinder and send to the TOC using voice communication [6]. There will be addition to the algorithm that will calculate the coordinates of the target using the coordinated of the soldiers, and the known distance to the target. This is done using simple geometry to determine third point when two points and all sides (distance) are known and is calculating the coordinated of the target and send them as an input to the algorithm with the received GPS data from the radios[7]. The following steps are same as the UAV model. System architecture of this model is represented in the following figure. Two team members use standard radio and laser rangefinder, and then the data is send via land mobile radio, to the team leader, and forwarded via Harris RF7800M and VHF Radio network to the TOC where the algorithm calculates the coordinate of the target and makes the decision in accordance to the created algorithm [8].

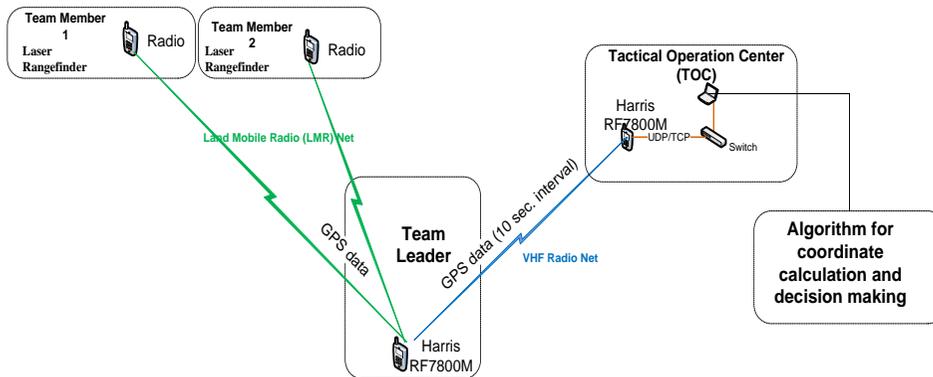


Image 3. System architecture for the distance model

#### 4. ALGORITHM

Steps of the algorithm:

**First:** for all our TEAMS we are checking the visibility to the goal by our GIS connected by UAV or voice communication.

**Second:** for TEAMS that have visibility we measure the distance to the goal.

**Third:** we get the information for weather conditions from nearby weather stations or our meteorological data.

**Fourth:** from the appropriate maps we get the appropriate probabilities of time to reach the person in affected area.

**Fifth** (and finally): the TEAM with the biggest probability to reach the person in affected area gets an order to save them or execute the mission.

#### 5. EXPLAINING ONE REAL SITUATION ON THE GROUND

We are giving real description of our algorithm. We have 3 Teams and for them we know the time needed to save the person in danger from 10 attempts in executing during real-time training session. Also we have number of saving in different weather condition: sun weather, haze weather, poor rain, and straight rain. Another important characteristic that we must to now is distance from the team to the person in danger.

SUN WEATHER			
TEAM 1	10attempts	600 meters	9saves
TEAM 2	10attempts	800 meters	7 saves
TEAM 3	10attempts	800 meters	8saves

Chart 1: Sun weather

HAZE WEATHER			
TEAM 1	10attempts	600 meters	7 saves
TEAM 2	10attempts	800 meters	6 saves
TEAM 3	10attempts	800 meters	8 saves

Chart 2: Haze weather

POOR RAIN WEATHER			
TEAM 1	10attempts	600 meters	8 saves
TEAM 2	10attempts	800 meters	7 saves
TEAM 3	10attempts	800 meters	9 saves

Chart 3: Poor rain weather

STRAIGHT RAIN WEATHER			
TEAM 1	10attempts	600 meters	5 saves
TEAM 2	10attempts	800 meters	4 saves
TEAM 3	10attempts	800 meters	6 saves

Chart 4: Straight rain weather

On this picture we have example of one possible situation on the ground. Our three (blue circle) and one enemy (red circle) soldiers are at the positions.

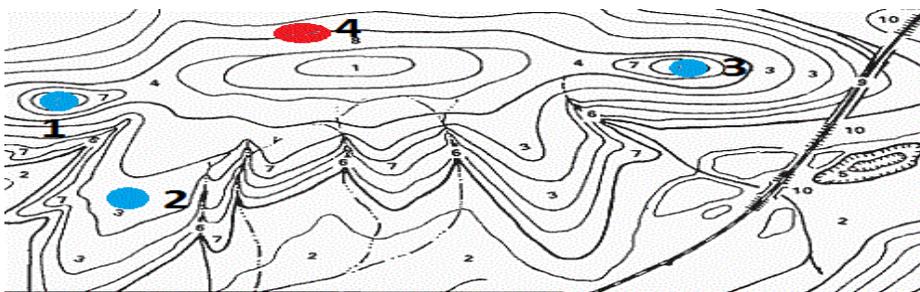


Image 4: Real position on the field

## 6. ALGORITHM WORKFLOW

**First:** From the ground situation TEAM 1 and 3 have visibility to the goal.

**Second:** The distance from TEAM 1 to the goal is 600m and the distance from TEAM 3 to the goal is 800m.

**Third:** The soldiers from the ground report us that the weather is sunny, and we are checking weather condition on android application.

**Fourth:** From the table's, we can see that probability for TEAM 1 is 9 and 8 for TEAM 3. This calculating will be automatically done by the application in our TOC center.

**Fifth:** Algorithm give us final result that TEAM 1is most suited to finish the task.

**Six:** The commanding officer gives the executive order.

## 7. CONCLUSION

Today we live in a time were the most important and power things are information . GIS has a fast growth in today world, but his capabilities are not explored completely. The possibilities that are offered from GIS have a wide range of use, and because of it, this information system nowadays is more and more used in various fields of study. Of course that military industry discovers different ways of composing this information system in manufacturing of new devices, vehicles and weapons and also in integrating of the GIS in the existing technologies. Some of the usage of GIS is for geo-

reconnaissance and C4IRSNet which was previously described in this paper. These subjects are already explored and have application in armies around the world for: tracking units or soldiers, reconnaissance of the enemy's terrain, tactical editing of the data from the ground, rapid and massive transferring of messages and orders, coordinate conversion, digital terrain elevation data information etc. A military information system based on connecting of these two powerful usages of GIS, will help the armies in the world and the decision makers for better observation on the mission on the ground and giving specific orders based on the information's collected from geo-reconnaissance and live-streaming of the crisis situation on the ground. Input values for the commanders represent the data from the geo-reconnaissance i.e. the situation on the terrain and the geo-location of the own units and soldiers. The command make a decision which represents an output value of the system, and it is send to the soldiers as a voice order or as movement navigation. We are using every modern equipment for solving every mission on different types of terrain and climate conditions supported by GIS on the web or softer [2]. This gives a chance for adopting this application on every terrain and any climate conditions with which means that it will be effective at every point where we have updated maps in GIS. We are hoping that with this software will help them all. The software is expected to decrease the casualties all around the world, in the crisis areas. And also organize the management in these situations. The low cost of the software is a big advantage in the development of the system.

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## PROVISION OF PERSONS AND PROPERTY IN CONTEMPORARY CORPORATION

Tatjana Gerginova<sup>6</sup>

**Abstract:** *Securing the security of the modern corporation is linked to the achievement of the goals and values of the corporation. The author will apply a qualitative approach to research, which will enable the use of a number of methods and techniques for analyzing the system for providing persons and property. The author will use the following methods: analytical method, descriptor method, and content analysis method. The author will analyze the system for securing persons and property and will determine the three reference objects of protection: persons, property and business of the company.*

*The subject of research is the system for securing people and property in the modern company.*

*Purpose of research is the importance of corporate security in scientific literature.*

**Key words:** *corporate security, providing individuals and property in the company, technical security, physical security*

### 1. POLICY CORPORATE SECURITY IN THE SCIENTIFIC LITERATURE

Numerous statistics and empirical data indicate that the corporation's business operations in contemporary global conditions is exposed to various types of threats and numerous risks.

In order to prevent the negative consequences and the effects of threats and minimize risks on the one hand, but also to increase stability, competitiveness and profitability on the other hand, all companies pay great attention to corporate security.

Corporate security refers to security issues related to security in companies that is, it is aimed at detecting crime, fraud and offenses in the corporation. This means that the existence of an effective system of corporate security, the company will be protected from other hazards that can interfere with normal operation of the corporation, and the protection of property, the business owners and employees of various risks and threats an integral part of modern life.

Corporate security is constantly involved in the mechanisms of business management, so that it protects the normal flow of business processes, removes acute security problems and to employees creates security conditions. With that corporate security is an integral part of the process that manage business risks within the business entity. More concretely speaking, corporate security working to establish plans and implement measures aimed at: protection of the recipient, protection of employees in the business organization, protection of property owned by business organizations, protection of information and the reputation of the business organization of material damage, criminal activity etc.<sup>7</sup>

The following considerations of corporate security can be found in scientific literature.

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According to Christopher Kjubig and David Brooks, corporate security is aimed at detecting fraud and offenses, and studies and real cases of corporate crisis, crime, and other crimes for which the professionals in corporate security should be aware of to ensure effective protection of people, operations and resources.<sup>8</sup>

Michael Genser believes that corporate security is adjusted to meet the structural risks for the company, through the application of certain models of simulation for implementing the best security practices in the company.<sup>9</sup>

Nicole Detelhof and Klaus Wolf in their compilation of landscaping materials, corporate security is aimed at corporate security responsibility, which is focused on the role of private business in conflict zones. It provides a picture of the types of contribution to peace and to security by transnational corporations.<sup>10</sup>

Peter Reid believes that corporate security should provide the necessary balance between the level of security in corporate, business and conventional demands of work complemented with wisdom, and thus offered radical but inspired proposal for success. In that direction should be a survey of companies with common sense and logic to better business consistency.<sup>11</sup>

Milan Milosević suggests that corporate security for its definition is integrated because it includes perform a number of functions that need to be synchronized. As such, it is a function of the corporation that controls and managing the coordination of all activities within the enterprise, and which relate to safety, continuity and reliability. The existence of an effective system of corporate security protects the company from any threatening actions, establishes the basis for making management decisions, provides the top management access to secret information and form processes and procedures that prevent spilling protected data from the corporation.<sup>12</sup>

Ivandikj, Karlovic and Ostojic corporate security defines as a strategic function of the company, which aims at realizing the safety of the business success of the corporation, which means: the elimination of all risks and threats that may affect business activities and achieving business success; reduction of the factors threatening the lowest possible level; business operation in crisis, i.e. overcoming the crisis and re-establish normal operations.<sup>13</sup>

According to the guidelines of the European Union, corporate security in corporations is defined as integral security,<sup>14</sup> which includes security and security issues, which, in turn, includes information gathering, security assessments and risk assessments, information security, crisis management, fire protection, explosions and accidents, protection of safety and health at work, and more.

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<sup>8</sup> Christopher J. Cabbage and David J. Brooks, (2012). *Corporate Security in the Asia-Pacific Region: Crisis, Crime, Fraud, and Misconduct*, CRC Press, pp. 3-16.

<sup>9</sup> Michael Genser, (2005). *A Structural Framework for the Pricing of Corporate Securities: Economic and Empirical Issues*, Springer-Verlag New York, LLC, pp. 196-238.

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<sup>13</sup> Ivandić Vidović Darius Karlović Lydia, Ostojić Allen, (2011). Corporate Security, Association of Croatian managers of security - UHMS, Zagreb, p. 34th

<sup>14</sup> Ivandić Vidović Darius Karlović Lydia, Ostojić Allen, (2011). Corporate Security, Association of Croatian managers of security - UHMS, Zagreb.

From the above considerations of corporate security it can be concluded that there is a lack of a specific definition of this term. The definition of this term is extremely difficult because the true nature and scope of corporate security is difficult to determine.

## **2. THE SYSTEM FOR PROVIDING PERSONS AND PROPERTY IN A MODERN COMPANY**

In the scientific-professional literature, as a result of numerous polemics and debates, it has been accepted that within the business systems there are three common reference objects of protection: persons, property and business of the company.

The category of persons includes: all employees (managers - managers and direct executors) in the company, as well as other persons who are on any basis staying within the company: company clients (visitors, buyers of goods, users of services), business partners (suppliers, contractors) and others.<sup>15</sup>

The property of a company in the narrow sense means the right to own movable and immovable things, monetary assets and securities and other property rights. In a wider sense, the company's assets include everything that the company has achieved with past labor and with its current appearance on the market: its name, trademark, corporate image, business data and information, fixed assets, spare parts, raw materials, a process of production, products, inventions and innovations and profits.<sup>16</sup>

Business operation of the company is the daily active relationship and work process, aimed at achieving a better and stable position of the company on the market and increasing its property.<sup>17</sup>

In modern global conditions an important component in achieving effective business operations of the corporation is the provision of persons and property in the company.

The company's security system for persons and property covers a range of measures and activities aimed at achieving physical and technical security and safety-protective component in order to prevent criminal activities and other forms, forms of threats to persons and property of enterprises, eliminate or removal possible consequences and detection of possible perpetrators of criminal offenses, in order to more effectively protect the vital values and successful operations of corporations. The system for securing persons and property in the company is the engagement of the physical component by applying a technical component and applying modern methods, methods and organization of work (security-protection component) in order to prevent or remediate the occurrence of threats to persons and property of enterprises, from damage or unauthorized appropriation of property of enterprises.<sup>18</sup>

It is about subsystems of physical, technical, fire and other security and protection (protection of work, protection of the environment), as well as safety-protective component. So, it is a complex system, constructed from multiple subsystems that have special power, resources, methods, organization, etc.

The basic goals of the system for providing people and property are safe and better working conditions, by providing and protecting the values of the company, in order to achieve a better position of the company on the market and increase profits.

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<sup>15</sup> Daničić, M., (2005). *Security of people and property companies in Republic Srbska*, Banja Luka, p. 7.

<sup>16</sup> Daničić, M., & Stajik, Lj., (2008). *Private security*, College of Internal Affairs, Banja Luka, p. 47.

<sup>17</sup> Daničić, M., & Stajik, Lj., (2008). *Private security*, College of Internal Affairs, Banja Luka, p. 47.

<sup>18</sup> Daničić, M., (2005). *Security of people and property companies in Republic Srbska*, College of Internal Affairs, Banja Luka. p. 15, 16.

The system for providing persons and property in the companies includes a number of normative, operational, information and educational and educational activities and measures that determine and establishes: organization of performance of works from physical and technical security, functioning of the services and the system for physical-technical security; personnel composition of the service for physical and technical security; equipment with necessary means and equipment; training and professional training of workers for physical and technical security for work, etc.

Physical security is usually organized in the form of physical security officers (managerial staff and direct executors) consisting of a number of officers possessing weapons and equipment, whose task is to provide the company with all its values and interests. Accordingly, physical protection is the protection of people and property of enterprises from destruction, damage, appropriation and other forms of action dangerous or harmful to the health of people and property of the enterprise.<sup>19</sup>

The physical security can be divided into 4 groups:<sup>20</sup>

- protection of persons and property;
- transport of money and other values;
- Protecting persons (bodyguard - bodyguard) and
- Providing public gatherings.

It is obvious that the grouping of things itself indicates the complexity of this content of the security and its place in the overall security system.

The extension of the activities of physical security, especially refers to the activities related to the transportation of money, protection of persons and provision of public gatherings. Securing is an integral part of the company's regular activities. The manner in which the immediate physical and technical security of persons and property is organized depends on many factors, and above all, the material possibilities, the number of objects that are kept, the nature of the work, and the like.

Technical security and protection of persons and property means security provided by means of technical means and devices whose type, purpose, quality and application are determined by special regulations.

Technical security is mechanical and electronic protection of persons and property and it implies an organizational arrangement within the security services in those enterprises in which it is organized.<sup>21</sup>

Technical security is provided in the area of premises or facilities that are provided, that is, during monitoring and security during transportation of persons who are provided directly, then during transportation of money, securities, precious metals and other values upon request interested parties.<sup>22</sup>

Accordingly, technical security is the protection and prevention of unauthorized access to a person or object, documents, funds, etc. using technical means and equipment. His appearance is understandable in the era of technical and technological achievements and, of course, contributes to achieving the efficiency of the security system. However, this does not mean reducing the role of physical security. Man manages the technical means of

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<sup>19</sup> Daničić, M., (2005). *Security of people and property companies in Republic Srpska*, College of Internal Affairs, Banja Luka, p. 8, 13.

<sup>20</sup> Daničić, M., & Stajik, Lj., (2008). *Private security*, College of Internal Affairs, Banja Luka, p. 29.

<sup>21</sup> Daničić, M., & Stajik, Lj., (2008). *Private security*, College of Internal Affairs, Banja Luka, p. 8, 14.

<sup>22</sup> Ibid, p. 26, 27.

protection, and at the moment of occurrence of the danger or the conditions for its occurrence, activates and takes measures to prevent or eliminate hazards.<sup>23</sup>

The assets and equipment used for the provision of technical security may be mechanical, electronic or combined. Mechanical means are various types of fences, ramps, special construction structures, safes, vaults and the like. The various types and forms of so-called systems of electronic devices and equipment provide the following: permanent supervision over the security facility from one place, cost-effective engagement of security workers, reconstruction of events, detection of unauthorized persons or illicit state, attaining the psychological effect in preventive sense, provision of control over the work of the security service, control of the introduction of explosive, ionizing and other dangerous substances, quick detection of burglary and sabotage devices, fires and more.<sup>24</sup>

The security-protection component of security, functionally connects the previous two components of the security system, and provides new content that highlights the whole system of providing persons and property of companies to a higher level. This type of protection is directed at the human being as an important factor in any security system and its relations with the internal and external environment and encompasses protection of the property and business operations of companies, including organization and legal regulation. The security-protection component in the broader sense is security-protection management as a way of organizing and managing the system for securing persons and property, while in a narrower sense it is a component of the security system in companies that covers the protection of the property and the overall operation of the company, an adequate organization of the company's operations in terms of protection and its legal regulation.

Subject to the interest of the security-protection component are: subjects of security, sources and forms of threats, method of employing new workers, prevention-prevention of violence at the workplace, proactive and reactive measures for protection of persons and property, culture and communication (including the rules of business ethics with a segment of protection), information protection and information systems, security procedures, intellectual property protection, training of managerial staff and all employees, mandatory check of creditworthiness - the benefit, protection of the name and the protection sign of the company.

In particular, it is considered that the safety-protective component includes: a culture of business protection (rules of business etiquette with segments of protection); protection of information; protection of intellectual property; protection of the name and trademark of the company; mandatory solvency check; training managers for securing the company and the personal system of business information.<sup>25</sup>

Current findings show that in practice the most common is physical and technical security, while the safety-protective component, which provides new contents of the security system, is practically neglected. Namely, the methods of work of the police and the forms of cooperation with the security system, which were applied in the previous period, are applied today, depending on the source and the forms of threats, the type of company and the degree of endangerment of the stated values of the company.

### **3. NEED FOR SAFETY MANAGEMENT AND RISK ASSESSMENT**

Corporate security tasks are to be found and at an early stage effectively prevent any development of threats that endanger the corporation and its operations. For the efficient

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<sup>23</sup> Ibid, p. 27.

<sup>24</sup> Ibid, p. 27.

<sup>25</sup> Ibid, p. 31

business operation of the corporation, security management needs to monitor the two main groups of reasons for the crisis (internal and external) occurring in the corporation:<sup>26</sup>

- External causes that occur in the company and do not have a significant impact (General market changes, changes in industry, global economic crisis, political changes, legislative changes, natural disasters).

- Internal causes, which are within the same corporation (inadequate and unusual management, incompetence, immoral leadership, underestimation of public opinion and subordinate, unrealistic goals and demands of trade unions, inefficient communication system, weak organizational culture, dissatisfaction and lack of motivation employees, lack of employee control, inadequate work organization and poor job relations).

The issues of corporate security include protection of property, persons and operations of the company, prevention of criminal activities of external and internal entities and internal supervision over the legality of the work of employees and management.

Knowing the legal regulations that prescribe the forms of criminal behavior and prescribing penalties and other sanctions for perpetrators of criminal acts can be an important element in the prevention and control of risks. The persons in charge of creating and implementing security measures within the company (managers and employees) must be familiar with a number of criminal-legal norms for several reasons:<sup>27</sup>

First, the frequency of certain types of criminality indicates the likelihood that the company will become a victim of a crime. The types of criminal activities that most often and most dangerous affect the companies are: property crime (especially the following criminal acts: theft, robbery, robbery, petty theft, fraud and evasion); cybercrime (especially criminal acts: making and entering computer viruses, computer fraud, computer espionage, damaged computer data and programs), criminal offenses against intellectual property (especially criminal offense: violation of the patent right) and criminal acts against the general safety of people and property (in particular causing general danger, difficult acts against the general safety of people and property). Among the most numerous are property and computer crime. Employees who attend the commission of a crime or managers who are familiar with the circumstances surrounding this crime become significant witnesses in the further court proceedings. If they know the criminal norms they can assess the danger that would result in the commission of the crime. Details that at first glance are less important can be crucial for the legal qualification of the crime. Therefore, the mentioned circumstances are of crucial importance in the process of proving the existence of a criminal offense and passing a guilty verdict and sentence. Knowing these details of persons responsible for security directly help them to protect the legitimate interests of the company and to eliminate the harmful consequences. Secondly, the legal concepts of a particular crime to some extent differ from the importance we attach to everyday speech. Thirdly, the failure to comply with the legal obligations related to the reporting of criminal offenses, as well as their preparation, entails criminal liability of the competent person.<sup>28</sup>

If we want to categorize the risks of the different types of delicts, we must take into account the weight of their potential consequence and the probability of their realization. The fact is that companies are susceptible to certain criminal offenses.

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<sup>26</sup> Gerginova, T., (2017). *Corporate security*, Faculty of Security, Skopje.

<sup>27</sup> Keković, Z., Bakreski, O., Stefanoski, S., Pavlović, S., (2016). *Planning and risk assessment - in the function of protecting persons, property and operations*, Skopje, Chamber of the Republic of Macedonia for private security, p. 167.

<sup>28</sup> Keković, Z., Bakreski, O., Stefanoski, S., Pavlović, S., (2016). *Planning and risk assessment - in the function of protecting persons, property and operations*, Skopje, Chamber of the Republic of Macedonia for private security, p. 167.

Here we first refer to criminal acts in the field of property, economic and cybercrime, as well as crimes that are related to the general security of poultry, property and intellectual property. Accordingly, the risk assessment process should encompass the analysis and assessment of the risks of committing crimes that are most commonly occurring in the company and can severely affect its assets and operations. Furthermore, it is necessary to take into account the fact that public enterprises, institutions and state bodies have a need for risk management, especially in situations when they perform their business activities. For example, state authorities can hire (this is done regularly) private security and ask for consulting services in the area of risk assessment of endangering the property that is being offered to them and those who work for them. Accordingly the analysis and risk assessment in their case must include criminal phenomena characteristic of the domain in which they are located, so in the categorization should also be added the criminal acts against the constitutional order and the security of the state. In addition, disciplinary offenses and offenses must take into account the severity and likelihood of the consequences as well as their frequency. None of these forms of unlawful activity, however, has no meaning or weight as a criminal act. We cannot say that the risk of committing a misdemeanor against the enterprise should be placed in the same ranking with the risks of criminal acts or of natural disasters and fires.

Based on the above, we can conclude that when assessing the risks of unlawful activity, the company's external entities must determine the type of crime that jeopardizes the company's business operations. There are the following types of crimes:<sup>29</sup>

- against constitutional ordering and security - terrorism, diversion, espionage;
- against the general safety of people and property - causing general danger, destruction and damage to public devices;
- against property - theft, robbery theft, robbery;
- against the security of computer data - damaging computer data and programs; and
- Against intellectual property - unauthorized use of a copyright work or objects of related law, infringement of the right to a patent, etc.

In order to prevent risks, the management of the corporation should take the following measures: These are my views

- Introducing an adequate system of physical and technical security of persons, property and property working;
- Prescribing and regular implementation of appropriate measures for protection against committing crimes to the detriment of the company;
- Education of employees for timely recognition of threats of criminal offenses and proper reactions, which could prevent or mitigate the consequences;
- Procurement and use of software for protection of computer systems, data and programs;
- Raising the level of information grievance of employees.

To ensure proper functioning of the corporation and protection from criminal conduct, it is necessary to continuously take a number of measures and activities by the corporation and by cooperating with the police, the Public Revenue Office and other relevant state institutions. The Ministry of the Interior is one of the state entities in the security system, which should cooperate and assist in the functioning of the system for securing persons,

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<sup>29</sup> Keković, Z., Bakreski, O., Stefanoski, S., Pavlović, S., (2016). *Planning and risk assessment - in the function of protecting persons, property and operations*, Skopje, Chamber of the Republic of Macedonia for private security, p. 170.

property and business in the company. That relationship with the Ministry of the Interior and the security system, that is, its role and place in the functioning of the security system, is an important link without which the system itself is unable to function adequately and respond to the challenges associated with time and space. In parallel with the development of the system, which was conditioned by the new emergent forms of threats, the development of certain organizational units at the Ministry of Interior, which represented the country's necessary response to the new forms of crime, also flowed. Experience shows that an active role of the Ministry of Interior is necessary, which, in addition to standard and routine work, already exists in practice, directs its work and advocates the continuation of studies and assessment of risk assessment in the future. This makes it a reason to be able to timely support the discovery of the source of threats, the identification of the dangers that come (proactive action) and / or the routes and methods of recovery from certain risks (reactive action) in order to reduce the negative consequences. This task must be carried out by the Ministry of Interior in cooperation with other participants in the realization of security, that is, the system of protection and other institutions and organizations. In order to effectively accomplish corporate security, it is also important to investigate the legal regulations, which determine the conditions under which a legal entity can perform this work and the authorizations of the employees in the companies and who perform the security activities. Finally, the successfully realized activities regarding securing persons, property and functioning of the companies and achieving proper cooperation with the police in the security system can be achieved by professional staff, which also implies certain types of education at all levels of performing these activities.

#### **4. CONCLUSION**

According to the guidelines of the European Union, corporate security in corporations is defined as integral security which includes security and security issues, which, in turn, includes information gathering, security assessments and risk assessments, information security, crisis management, fire protection, explosions and accidents, protection of safety and health at work, and more. Corporate security is without doubt a concept and refers to issues related to security in companies or corporate security is aimed at detecting crime, fraud and offenses in the corporation, various crimes of (political crime - terrorism, sabotage, espionage, general crime - theft, severe and armed robbery, robbery, deprivation of motor vehicle, fraud, extortion, kidnapping, fire, economic crime - corruption, unethical operation, abuse of official position or authority, embezzlement, receiving and giving bribes, disclosing official secrets); and lately frequent dilemmas in relation to computer crime. This means that the existence of an effective system of corporate security, the company will be protected from various threats that may impede the normal operation of the corporation, and the protection of property, the business owners and employees of various risks and threats an integral part of modern living. Corporate security is constantly involved in the mechanisms of business management, so that it protects the normal flow of business processes, removes acute security problems and employees creates security conditions. With that corporate security is an integral part of the process that manage business risks within the enterprise, and working to establish plans and implement measures aimed at: the protection of customer service, protection of employees in the business organization, protection of property ownership business organizations, protection of information and the reputation of the business organization of the material damage, criminal activities etc. We can conclude that for the efficient realization of security in the modern corporation it is necessary to realize the following contents: These are my views-acquiring knowledge that corresponds with modern security situations and provides continuity in the business of the corporation; continuous analysis of the causes and forms of

endangering persons, assets and operations of the corporation that should be expected in the future; Assessment of the degree of endangerment of persons performing activities in the corporation related to the protection of its vital values. In today's open market competition, each business entity has the opportunity for business success. Corporations, if they want to work successfully in modern conditions, must anticipate future events and threats, and top management is obliged to define primary business responses to all challenges. In addition, the operation of today's corporations cannot be observed in isolation, but it is related and depends on a number of circumstances and events.

Precise the competencies and powers of the people working in the company works on protecting its vital values (Reputation of the company on the market, its corporate image (reputation), morale and motivation of employees, Strategic development plans, Competition analysis), and determining the state of expertise and motivation of persons working in the company;

- Organization and realization of physical and technical security in all buildings that belong to the company;

-Harmonization of the normative acts in all segments of security, with the national regulations and the standards of the European Union.

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## MIGRATION AND STATE SECURITY

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**Abstract:** *The paper examines the phenomenon of increasing migration flows from Africa and the Middle East to Europe and especially to Italy. The political and economic causes that led to the phenomenon of such mass migrations are examined. The paper focuses on the legal, political, economic, social and cultural aspects (in terms of identity of the peoples of the States of arrival) that affect the security needs of the destination States and specifically of Italy for its direct and greater exposure to this phenomenon of mass migration.*

**Keywords:** *Mass Migrations, Globalization, Security, Statehood, Sovereignty*

### 1. INTRODUCTION

The problem of mass migrations to the European Continent is the most serious and devastating problem that today characterizes the life of the international Community.

This phenomenon which arises suddenly but which has its ideological or political roots in a distant past, produces uncontrolled and, to date, uncontrollable effects on the social, economic and identity level and, above all, with regard to the internal security of each State of destination of such migratory flows. In a closely connected manner such a phenomenon also involves international security as regards the relations between the States.

The so-called "do-goodism" which translates into the untenable proposition of an indiscriminate and unlimited reception, or is attributable to a total inability of historical and political analysis of the phenomenon, or is ascribed to a precise ideological or political design, as we said.

This design, which objectively turns to produce devastating effects, especially in terms of safety, in the States of destination of the greater part of these migratory flows, is usually justified in the name of a principle of a cultural or humanitarian aspiration and of a "Egalitarianism" devoid of content and result of a total incapacity for critical evaluation.

It seems to manifest itself as the most precise realization of what was hoped for in the famous (or infamous) plan elaborated by Koudenhove Kalergi, and finalized (in the name of some unknown higher purpose or need) to the realization of a sort of worldly *cross-breed* aimed at achieving of the merely ideological aspiration of *inter-ethnicism* or worldly *interculturalism*.

Undoubtedly, in the present historical phase of *globalization* or *internationalization*, this phenomenon is easily justified and therefore favoured in the name of those principles and aspirations<sup>30</sup>.

However, the idea of *globalization* must be immediately distinguished from the idea of *internationalization*: in the second one can find coherence (which is not sharing) those principles and aspirations; in the first one, vice versa, the reference is completely improper

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<sup>30</sup> On this issue and on the relationship between globalization and security, see: KIRSHNER (ed.), *Globalization and National Security*, New York, 2006; VALVO, *Influences of the economic globalisation on the current crisis migration in Europe*, in *Journal of Liberty and International Affairs*, Bitola, 2016.

and incongruent since *globalization* can be traced back to a uniform discipline of the trades, of the economy and of the so-called *markets* that have no regard with the phenomena of mass migration of which they don't constitute a necessary presupposition.

And this also beyond what *globalization* intrinsically means and how indispensable, inevitable and irresistible it appears to be: we refer to the *globalization* of the means of communication, the means of transporting of people and goods and of anything else that facilitates the inter-individual relations and the closest interconnections for which figuratively the world in its entirety is referred to as the *global village*.

Regarding the effects of mass migratory phenomena towards the States of greatest destination of these, it must be immediately said that the first consequence is the damage of the cultural identity and of the traditions of the populations present on the territory with the consequence of a *weakening*, so to speak, of the national legal systems that are confronted with radically different instances, cultures and traditions and which are expressions of different and incompatible *scales of values*.

To the lesion of the identity of the State in the terms previously given, it inevitably follows a corresponding injury or *reduction* of the *statehood* in the sense of loss of authority and of the functions that are proper to the State.

The reversal of such effects or consequences, the change in the traditional characteristics of the State, clearly shows how the internal security of the State in terms of maintaining public order is severely compromised, as well as the international security concerning the orderly conduct of peaceful relations between the States<sup>31</sup>.

With regard to the European Continent in the current situation, the phenomenon of mass migrations from Africa and the Middle and Far East goes in its greater part towards the Italian State for its geographical location, for its economic condition, for the unfounded expectations of better living conditions that it provokes in the broad masses of "migrants"; but it must be added that the preordained "destination Italy" is due to the assumption, to a large extent true, of the absence of checks at the entrance, of the availability to an uncontrolled and unlimited reception, of the absence or bland application of the rules of civil conduct the respect of which is required to foreigners.

In other words, it is the consequence of an already advanced process of loss of statehood, as previously mentioned, with regard to the Italian State where the situation is characterized by internal political opposition deliberately aimed, by one of the political parties in competition, at exploiting the presence of so-called "migrants" who ask to enter the Italian territory.

## **2. THE CONSEQUENCES OF THE STATE OF ILLEGALITY DUE TO ILLEGAL IMMIGRATION**

It must be said immediately that, apart from a small percentage estimated at around 7% of so-called "migrants" who meet the requirements for the granting of political asylum, the remaining part is represented by the so-called "economic migrants" with respect to whom

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<sup>31</sup> With regard to the consequences in terms of safety related to the phenomena of mass migration, see, among the many, BOURBEAU, *The Securitization of Migration. A study of movement and order*, London, 2013; CENTONZE, *Sicurezza e immigrazione: la nuova disciplina dell'immigrazione dopo il c.d. pacchetto sicurezza*, Padova, 2009; CHEBEL D'APPOLLONIA-REICH (eds.), *Immigration, Integration, and Security: America and Europe in Comparative Perspective*, Pittsburgh, 2008; JEANDESBOZ, *Reinforcing the Surveillance of EU Borders. The future development of Frontex and Eurosur*, in *CEPS Research Paper*, n. 11, 2008; LAZARIDIS (ed.), *Security, Insecurity, and Migration in Europe*, Surrey, 2011; RANALDI V., *Mass Migration and Security: Legal Instruments for the Management of the Current Migratory Crisis in Europe*, in *Security and Crisis Management – Theory and Practice*, Belgrade, 2017, pp. 331-336.

there isn't any international nor national internal of the States normative base on which a title of legitimacy can be founded for the entry and the stay in the territory of the State.

Therefore, this almost total remaining part is made up of illegal immigrants who, once they enter the territory of the State, without any personal document, make themselves difficult to repatriate or in any case untraceable and therefore uncontrollable.

The first objective datum confirming the serious impairment of the internal security of the State can be obtained from the exponential increase in crimes committed by so-called "migrants", by the majority number of their presence in state prisons and by the serious disturbances of the internal public order put into place by them with repetitiveness and exponential growth, and also with brutal episodes of violence.

This situation is not only of Italy but also of other States that are also part of the European Union, such as France, Belgium, Germany, Sweden, Holland, Spain, etc. It must immediately be said that the phenomenon now under examination is not ascribable nor evaluable on the basis of a *legal parameter*, and this for two reasons: the size of the phenomenon has "skipped" the system and the legal discipline both at national and European Union's level; moreover, the phenomenon moves from political causes and purposes aimed at the political and economic destabilization of the States of destination and, therefore, of the European Union itself (this will be explained later).

Therefore, it is not a matter of European Union law and of the specific EU legislation in the matter referred to in the various Dublin Regulations which have occurred over time and which have proved to be completely unsuitable for dealing with and regulating the phenomenon, as said before. This also for a real lack of cohesion among the Member States of the European Union, concerned only with the care of their own national interests<sup>32</sup>.

The attitude of France in this regard is emblematic. In juridical terms and for what concerns in particular the problem of the security of the State in the face of a phenomenon that is not exaggerated to define as an invasion, there is the indispensable and undisputable right of the State, of every State, to defend its borders with any legitimate means available; and thereby defending the orderly conduct of social life within it and therefore the "holding" of public order; as well as the autonomous power of the State, of each State, to juridically regulate the *condition* of the foreigner present in its territory, albeit within the limits of the respect of the law of the European Union and of the general and conventional international law concerning the *condition* of the foreigner towards the State in whose territory he is present. Equally indispensable is the right of the State, of every State, to safeguard its economic interests and to safeguard an indispensable principle of equality, if not of priority in the sense of giving priority to rights and provisions to its citizens.

In this regard, yet an objective fact makes it clear that even on the economic level the security of the State in terms of social stability and in terms of availability of financial resources can be compromised: as shown in the final balance for the year 2017, the Italian State has spent about five billion euros for the uncontrolled and unlimited reception of the so-called migrants; the Italian forecast budget for 2018 provides for the largest expenditure of about seven billion euros for the same reason.

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<sup>32</sup> For a legal analysis of the international, European and national discipline on this subject see: CARELLA, *Esodi di massa e Diritto Internazionale*, in *Rivista di diritto Internazionale*, n. 4, 1992, p. 903 ss.; CAGGIANO, *I percorsi giuridici per l'integrazione: migranti e titolari di protezione internazionale tra diritto dell'Unione e ordinamento italiano*, Torino, 2014; COSTELLO, *The Human Rights of Migrants and Refugees in European Law*, Oxford, 2016; GAMBINO-D'IGNAZIO (eds.), *Immigrazione e diritti fondamentali fra Costituzioni nazionali, Unione Europea e diritto internazionale*, Milano, 2010; KLEPP, *A Contested Asylum System: The European Union between Refugee Protection and Border Control in the Mediterranean Sea*, in *European Journal of Migration and Law*, n. 12, 2010, pp. 1–21.

It is an expense that certainly cannot be understood as an investment since it has not derived any *return* in economic terms.

It should be added that this happens in the Italian State, where the unemployment rate is growing and at the time is around 13% (41% in terms of youth unemployment in the South); where the poverty line involves about five million citizens according to data from the National Statistics Institute; where, finally, from 2012 to today there have been about five thousand cases of suicide due to lack of work, company bankruptcies, poverty.

Still an objective fact must be kept in mind to evaluate this phenomenon of mass migrations in correct terms. In 85% of cases they are young people with a strong and robust physical constitution, largely coming from African countries of the Saharan sub-continent, who do not flee from any war; only the remaining 15% of cases are women, children and unaccompanied minors.

Another objective fact regarding the situation in Italy in terms of security in the political, social and economic sense: about 1,400 cases of so-called "refugees" were detected that after being accepted in Italy in violation of every law and regulation, they then returned to the countries from which they fled to spend their holidays with money evidently earned through the commission of crimes, and then after returning to Italy; as well as there are numerous cases of former "refugees" who receive pension treatment in the countries from which they fled and in which they returned.

### **3. SOME POLITICAL CONSIDERATIONS**

What has been described above and which is asserted without fear of denial, makes it completely sterile to deal with this phenomenon of mass migrations in legal terms. This would constitute a conscious or unconscious operation of mystification of reality still aimed at favouring a preordained political plan.

As already stated, this is a political plan aimed at the preordained economic and social destabilization of the States of the European Continent, and in particular of Italy.

Just remember a few things: the purpose of the so-called "Arab Springs" (so called already twenty years earlier as it emerged from documents acquired at the US State Department); and in particular the "Libyan spring", that is the pre-ordained and vulgar Anglo-French aggression with the support of the USA, to seize the natural resources of that Country, to seize the huge gold reserves of the Tripoli Bank and, above all, to prevent the Libyan government of Muhammad Gaddafi to realize the project of the African single currency guaranteed by those gold reserves, which would have swept away the so-called French franc in circulation in 14 African states former French colonies, which would have deprived France of this inadmissible rent, reducing it on the economic level, as has been pointed out, to a State of the so-called *third world*.

Suffice it to think how the end of the Libyan regime has favoured the process of mass migrations that almost completely moves from the Libyan coast towards Italy.

Nor should be forgotten the devastation of the US with Anglo-French support in the Middle East, and always for reasons of economic and financial dispossession: among the Middle East States Syria is one of the eight remaining states in the world that still has its own autonomous and independent Central Bank, that is, exercising its monetary sovereignty and this is the instrumental objective that nefarious policies want to pursue: the abolition of the monetary sovereignty of the States.

All that has happened cannot be ascribed only to errors in foreign policy, nor we can believe that everything that has happened and still happens is done - to evoke an instrumental legal profile - in the name of defending the fundamental rights and freedoms of the individual or the need to *export democracy* that is a "need" felt only by those who export it to pursue other and illegal purposes.

It is not without significance the fact that almost all of the present migratory flows come, as we said, from the sub-Saharan States of the African continent and enter Libyan territory to the point of contact between Chad and Libya, presided over by French Armed Forces who not only do not prevent but favour these uncontrolled and indiscriminate passages towards the Libyan coast of the Mediterranean.

#### **4. POSSIBLE SOLUTIONS TO DEAL WITH THE PHENOMENON OF MASS MIGRATIONS**

Given the extremely serious situation that has arisen and in order to put the problem in legal terms, the imagined revisions of the last Dublin Regulation are not enough, nor hypothetical new agreements between the Member States of the European Union in terms of numerical distribution of the so-called migrants; nor other legal measures, so to speak, seem imaginable or adequate to contain the phenomenon.

To safeguard the security of States against the consequences of the phenomenon of mass migration (which in substance could also be qualified as "mass deportations") especially in terms of the defence of the statehood, the economy of the State and the maintenance of measures although minimal on the social, welfare and assistance level, it is necessary to adopt other measures as far as these may appear to be radical.

Radical but certainly justified in the face of the preordained design of social and economic destabilization certainly desired not by the countries of origin of these people, but wanted by the Western hegemonic States, namely the "chinesisation" of the labour market for the benefit of multinational companies and world and global financial "élites".

The ultimate or intrinsic finality is also another and that is that of a simpler *government of poor populations without rights*.

In conclusion, the only legal instrument suitable to deal with the phenomenon and to guarantee the internal security of the State is not represented by the conclusion of repatriation agreements with the countries of origin of the so-called migrants, which would be difficult to implement just because they come deliberately without identity documents (but in possession of the latest generation of mobile phones); the only instrument suitable in terms of international law is that well known and already practiced several times by the States, including Italy, of the naval blockade of the coasts. In this case, and for what is now interesting, the naval blockade of the Libyan coasts by Navy means.

It can be objected that this means constitutes, as indeed it is, an *act of war*. But, beyond the necessity that justifies and legitimizes it, a war against whom? What is the current state expression of Libya? That of the government of Tripoli or that of the government of Benghazi?!

The Libyan territory in its entirety is not due to a uniqueness of internationally responsible government and it is frankly very difficult (and politically specious) to speak today of a Libyan *statehood*.

Therefore, even in the presence of the peculiarity of the real situation as it presents itself today, the recourse to the juridical instrument of the naval blockade of the Libyan coasts, from which it moves in its almost totality the mass migratory phenomenon discussed, is even more justified and legitimized.

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## ENVIRONMENTAL RISK MINIMIZATION: BEST AVAILABLE TECHNOLOGIES FOR LANDFILL LAYER DESIGN

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**Abstract:** *One of the main environmental risks of waste landfilling is leachate penetration into groundwater and soil, as landfill leachate may contain various hazardous substances. Potential risk may be reduced with adequate bottom and top layers containing impermeable layer. If landfill impermeable layer is not properly designed, significant quantities of leachate may reach groundwater and pollute it. The Landfill Directive defines a mineral layer thickness and value of permeability coefficient. In this paper several parameters regarding impermeable layer design will be analysed and discussed, such as: material properties, method for equivalent protection determination, permeability coefficient, layer thickness etc. The authors are grateful to the Ministry of Education, Science and Technological Development of the Republic of Serbia for the support (grant number TR 34009).*

**Keywords:** *Environmental risk, landfill, permeability coefficient, leachate*

### 1. INTRODUCTION

Waste management hierarchy consists of several options, among which landfilling has been considered the least preferred option. One of the reasons is environmental risk related to leachate. Landfill leachate generates in two ways: a) as a product of waste degradation reaction, and b) when rainwater infiltrates through landfill waste. In both cases, a generated leachate is highly polluted, containing numerous hazardous substances such as suspended solids, biodegradable organics, heavy metals, polycyclic aromatic hydrocarbons and other. This is particularly evident in less developed countries due to poor waste acceptance procedures at landfills. Environmental risk may be minimised if landfill's protective layers have sound technical design. It should cover whole life-cycle of a landfill, starting with a design of landfill bottom layers and ending with a design of top cover. Impermeability of landfill is determined by bottom and cover layer – natural or artificial mineral layer. Two key factors affecting permeability are layer thickness and material permeability coefficient  $K$ . The Landfill Directive defines their values depending of landfill class (non-hazardous, hazardous or inert) [1]. Also, different requirements are set for bottom and cover layers. Main purpose of cover as impermeable layer is to stop penetration of rainwater into landfill body, and consequently reduce leachate quantity in passive phase of landfill life. Bottom layer is barrier that prevents leachate to reach groundwater. It is important to stress out that

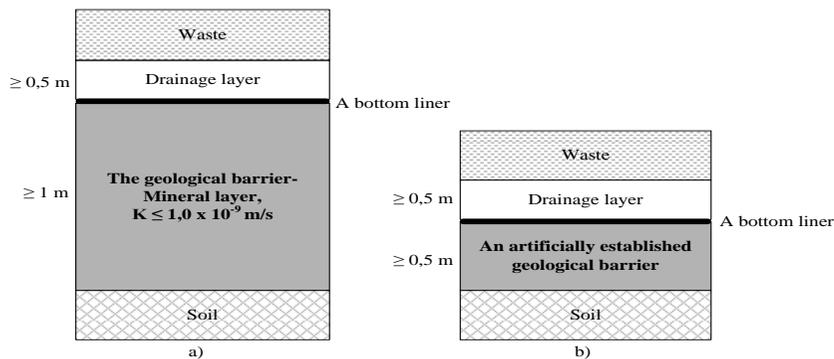
if landfill does not have bottom layer, then cover layer should provide higher protection level. Best available technologies, hereinafter BATs are closely related to industrial emissions and industrial facilities that could significantly influence environment. BATs are recommended technologies with related emissions values, described in BAT reference documents, so-called BREFs. In area of landfilling, there is none BREF document, but some EU countries recommended The Landfill Directive as BAT [2]. General requirements and technical details for all classes of landfills are presented in Annex I of The Landfill Directive. Dajic et al. [3] perform comparative analyses of EU regulation in area of landfilling and suggested amendments to the Landfill Directive text. The aim of this paper is to analyse technical requirements defined in legislation, and to suggest some improvements as BATs.

## 2. IMPROVEMENT OF LANDFILL LAYER DESIGN

One of the main goals of impermeable landfill layers should be prevention of leachate reach groundwater and soil and thus reduce environmental risk. Efficiency of layer may depend on several factors, such as impermeable material properties, method for equivalent protection determination, permeability coefficient, layer thickness etc. BAT should be not just state-of-the-art technology, but also cost effective. Properly designed layers (bottom and top) assure long-term benefits, including lower financial burden, post-closure maintenance and monitoring of landfills. The Landfill Directive set the following requirements for impermeable layer [1]:

- Landfills for hazardous waste:  $K \leq 1.0 \times 10^{-9}$  m/s; thickness  $> 5$  m;
- Landfills for non-hazardous waste:  $K \leq 1.0 \times 10^{-9}$  m/s; thickness  $\geq 1$  m;
- Landfills for inert waste  $K \leq 1.0 \times 10^{-7}$  m/s; thickness  $\geq 1$  m.

Figure 1 shows difference in requirements depending of type of impermeable layer material. Note that a value of permeability coefficient of an artificially established geological barrier is not explicitly defined.



**Figure 2.** The Landfill Directive requirements for the bottom layer of the non-hazardous waste landfill: a) natural and b) an artificial barrier

### 2.1. Material properties

Commonly used materials have been natural clay, geosynthetic clay liners (GCLs) and polymer enhanced bentonite-sand mixture (PEBSM) [4]. All these materials may fulfil the Directive requirements for layer thickness and permeability coefficient  $K$ . But water permeability is a much more complex term. There are several material properties that should be in focus, such as mechanical and chemical stability, lifespan, installation procedures, etc. For example, Allen has shown that impermeability of clay and GCL

deteriorate in time as consequence of chemical reactions between material and pollutants from leachate [5]. Waste degradation and leachate generation may last for decades, so risk for environmental pollution is present for a long time after landfill closure. If impermeable material is corrupted, pollution will occur. It could also increase after-care maintenance cost because of higher amount of collected leachate to be treated. Lifespan of material is a consequence of previously mentioned material properties. Wet-dry cycles have an impact on long-term properties of materials [6]. As waste degradation is a very long process, the material should provide long-term protection, possibly longer than 50 years. It is expected that clay has the shortest lifespan, it is sensitive to wet-dry cycles and cracks are common. During design of impermeable layer, comparative analysis of materials has to be done. It should include estimation of chemical stability related to common pollutants, mechanical stability on slopes and during seismic activities and expected lifespan.

## **2.2. Method for equivalent protection determination**

The Landfill directive Annex I define term equivalent protection: “Where the geological barrier does not naturally meet the above conditions, it can be completed artificially and reinforced by other means giving equivalent protection. An artificially established geological barrier should be no less than 0.5 meters thick” [1]. In practice, a method for equivalent protection determination has not been established. How to correlate material property and its thickness? Also, barrier may be composite material consisting of several layers. For example, common practice is to fulfil The Landfill Directive requirement for layer thickness by combining several centimetres of impermeable material (5-10 cm) with sand (>40 cm). Should equivalent protection be estimated for layers separately or combined? Improvement of landfill layer design should include elaboration of method for equivalent protection determination on the national level. Similar to developed countries (such as Germany and The Netherlands), methodology may be based on Darcy’s law [3]. Measured permeability coefficient of the material combined with limiting values of parameters shows layer thickness that satisfy The Landfill Directive requirements. Limit values of parameters should be adopted to describe a country specific condition (including climate type, average precipitation levels etc.). Calculation of material equivalent protection value must be part of technical design documentation.

## **2.3. Permeability coefficient**

Permeability coefficient is a key property of applied material. There are several measurement techniques with different setup parameters such as consolidation, hydraulic gradient, permeant liquid and specimen dimensions. Dajic et al [3] has analysed technical requirements and recommendation of each techniques. Analyses results with conclusion that only qualified personnel should interpret measurement results, within accredited laboratory. Also, applied measurement parameters should be as close as possible to field conditions. For example, fluid used in experiment should be similar to leachate, because chemical stability of material may affect permeability coefficient value. If tap water is used, environmental risk is increasing. In design process, technical documentation should contain the laboratory report with data about values of parameters applied during testing procedures.

## **2.4. Layer thickness**

According to the Landfill Directive, impermeable mineral layer should have thickness of 1 or 5 m, depending on landfill class. Minimum thickness of an artificially established geological barrier is 0.5 m. This may be important if available area for landfill is finite. If clay is used as mineral layer, working volume of a landfill is considerably less than if GCL or PEMSB is used.

## 2.5. Artificial sealing liner

Artificial sealing liner is requested as part of bottom layers. Usually, it is high-density polyethylene foil. In some cases, role of sealing material could be misunderstood. It should be stressed out that HDPE foil could not be replacement for as the impermeable layer.

## 2.6. Quality assurance

During erection of landfills, claimed properties of material should be proven in quality assurance procedure [7]. Quality assurance should define strict measurement conditions and ensures uniform properties for material as a whole. This is especially important in case of materials in form of rolls that are connected by overlapping joints. Joints permeability should be measured separately.

## 3. CONCLUSION

Landfills are common waste management practice, especially in developing countries. If not properly designed, it could represent a big environmental risk. Landfill leachate, containing high levels of hazardous substances may reach groundwater and soil and polluted it. Therefore, solid design reduces associated environmental risk. This paper describes several parameters affecting impermeable layers. In the process of layer design, the choice of impermeable material should be based on comparison of materials chemical and material stability and expected lifespan. These properties affect maintenance and post-closure costs. Often, used materials are composite, and they should provide “equivalent protection”. On national levels, methods for equivalent protection should be described, and limit values of parameters should be strictly defined. During landfill erection, quality assurance should be binding. All measures previously described ensure decrease of environmental risk in the area of waste landfilling. Proper design of bottom layer ensure that leachate will not penetrate into groundwater or soil, while top layer ensure that minimal or none quantities of rainwater will reach inside landfill body, thus generated leachate will be minimal. Also, proper design ensures small environmental risk for a long period of time after landfill closure.

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## EXAMINATION OF POLLUTANT BY IMISION MEASUREMENT IN THE AREA OF THE TAILING LANDFILL OF IBAR MINES COAL SEPARATION

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**Abstract:** *The Ibar coal mines are engaged in exploitation of coal for more than ninety years in the jars Jarando, Usce and Tadenje-Progorelica. In 1963 the coal separation in Piskanja-Baljevac was built according to the principle of float-sink, as well as the depot for tailings, and later the factory for the production of construction elements out of mining slag. Mining slag is formed during the oxidation processes occurring at the separation tailing pond. The separation tailings consist of small and large classes of rocks that occur in the productive series of deposits of Ibar mines and small classes of coal below 0,5 mm. During the oxidation process at the separation tailing pond there is an imission of pollutants in the environment of the landfill dumps. In order to determine the degree of environmental impact of the before mentioned oxidation process, testing of pollutants was carried out by measuring the imissions in the vicinity of the dumping site in 1995. Also, in 2016, after the change of technology in separation, the ambient air quality was tested at the location of separation of the Ibar mines. The results of the test will be presented in this paper.*

**Keywords:** *coal, tailings, oxidation process, pollutants.*

### 1. INTRODUCTION

Almost all pollutants in the environment appear as polydispersion, and rarely as monodispersion systems. This allows them to spread to smaller or greater distances from the place of preparation or emission. Air can be polluted hundreds of kilometers from the point of broadcasting. Meteorology is one of the important factors in viewing the problem of the distribution of pollutants because the change in meteorological parameters has a significant impact on the emission state. Air can be contaminated with substances that can be in the form of particles, aerosols, gases, vapors, thickets, fly ash and other forms. Air pollution can appear in urban areas as well as in industrial zones, as is the case where coal mining is exploited and separated [1].

Since the Ibar mines are engaged in the exploitation of coal, commercial coal has been obtained in the process of coal processing in separation in the previous period. After cleaning the open pit coal, pure coal occurs and a tailing of -150 mm +10 mm, which was transported to separate tailing bins. These were driven by trucks to the tailing pond in the immediate nearness and within the separation in Piskanja [2].

In order to monitor the quality of the air in this area, a contract has been concluded between the Ibar mines and the Mining Institute in Belgrade. Contract foresaw that pollution testing should be carried out by measuring the imissions in the vicinity of the tailing dump in February 1995. In addition to that, the Institute of Safety, Quality, Environmental Protection and Health "27. January " D.O.O. -Nis did the testing of ambient air quality, at the location of coal separation, in the Ibar mines in the period of 23.03.2016 until 21.04.2016. The results of these tests are going to be presented in this paper.

## **2. IMISSION MEASURING**

Before accessing the organization of the measurement of the air pollution, it is necessary to clearly define the purpose of the measurement, in order to obtain the data that serves the least effort and cost. The same measuring network cannot give data usable for all purposes. Measurement of pollutant concentration can be done due to: determining the state of pollution and quality assessment, monitoring changes in pollution levels, checking citizens' complaints, assessing people's exposure, etc. In order to decide which pollutants should be measured in the air, the scope of the observed area should be determined, the pollutant poll in the observed area must be made, the emission cadastre map (the emission density chart of each pollutant per unit area) should be chosen, based on the data analysis determine the critical parameters of the existing contamination to be measured [1].

### **2.1. Organization of the measurment**

The organization of the measurements depends on whether they are preliminary, permanent or targeted measurements. The number and arrangement of the measuring stations depends on the type of measurement, the size of the settlement, the configuration of the terrain and the meteorological parameters for the observed area. The duration of the collection of samples should be adjusted to the character of the possible effects on humans and their environment, type of source and emission dynamics, but may be conditioned by the sensitivity of the available analytical method. The samples can be collected over a short period of time (1 h), a medium time period (24 h) and a longer period of time (a week, a month, etc.) [1].

### **2.2. Monitoring of air pollution in the vicinity of tailing repository**

Air pollution in the vicinity of coal tailing dumps is due to the combustion process, which occurs in the tailings due to self-heating of coal. The basic substances that pollute the external atmosphere, which are generated by coal combustion, contained in the tailings are: sulfur dioxide, soot, carbon monoxide and hydrogen sulphide. In addition to these substances, pollution of sediment is also monitored in this paper. Determination and monitoring of the concentration of harmful substances in the atmosphere of the tailing dumps includes the determination of mean and short-term concentrations of characteristic pollutants for a given source. The speed and the direction of the wind determine where the atmospheric pollutants will probably be transported and how they will change over time, as well as the frequency of appearance of conditions unfavorable to dispersion.

Dispersion conditions are low wind speeds and stability of the atmosphere. At an unstable state of the atmosphere, a pollutant emitted near the ground is quickly spreading in a horizontal direction, and the wind speed helps this process. All this data must be taken into account when forming a network of measuring stations [1].

To locate measuring stations, meteorological elements that refer to the wind direction and the wind speed values are considered, as well as the relevant frequencies of the wind. By measuring, data on climatic conditions disadvantageous to dispersion, or distribution of pollutants in a smaller area were obtained, which prevents greater dilution and thus influences the increase in the concentration of pollutants in the investigated area. Given the data, the size of the settlement and the fact that the landfill is located in the immediate vicinity of the settlement, it was decided to set up three measuring stations. Measuring sites are located in the direction of the southeast-northwest, which is selected based on the wind rose for the given area, shown in Figure 1.



**Figure 1:** Geographical view of the area with the wind rose for the given area [1]

The volume of air taken for analysis is measured by the appropriate flow meters. Methodology for measuring and analyzing the presence and concentration of these pollutants was selected in accordance with the Rulebook on limit values, methods for measuring immission, criteria for establishing metering points and data records (Sl.glasnik RS br. 54/92) [3]. Samples for the analysis of the presence of sulfur dioxide and soot were collected by an eight channeled device for automatic 24-hour sampling, consisting of eight emulsifiers with the corresponding absorption solution. Before passing through the washbasin, the air sample passes through a filter representing the absorption center for the soot. The amount of air is measured by the built-in gas clock. Determination of the concentration of sulfur dioxide in 24-hour air samples is based on a standard acidimetric method. Sulfur dioxide is absorbed in a 0.1% hydrogen peroxide solution and it is oxidized to sulfuric acid determined by titration with sodium tetraborate to the BDH 4.5 indicator which excludes CO<sub>2</sub> from the air.

The smoke concentration is based on the reflection degree using the E.E.L. photometric determination of clamping on cellulose filter (Whatman 40 No). The speed of the air flow through the filter is such that particles with a diameter of less than 10nm are deposited on the filter. The content of smoke is calculated according to the recommendations of the OECD Group. Using long-term research, monitoring the degree of air pollution around the source of pollution shows the contribution of seasonal sources to the existing level of pollution. The method is very sensitive (the sensitivity threshold is 1 µg/m<sup>3</sup>) [1].

The sedimentary matters are all those substances in a solid, liquid or gaseous state that are not part of the atmosphere and are deposited by gravity or rinsing with precipitation from the atmosphere to the ground. Apparatus for collecting samples of sedimentary matter is, as a rule, open containers exposed to the atmosphere during a certain period. The concentration of sedimentary matter has been determined in accordance with the legislation (Sl. Glasnik RS No. 54/92). The sample was collected in an open container for a period of one month continuously. The sediment was analyzed for the presence of total, soluble and insoluble sedimentary matters. Determination of the carbon monoxide concentration was performed by an infrared gas analyzer specially calibrated to determine the immission concentrations. The method of determination of hydrogen sulphide is based on the interaction of AgNO<sub>3</sub> with sulfosols resulting from the absorption of H<sub>2</sub>S in the solution of arsenic nitrates. In this case, silver sulfide is formed which scores a yellow color solution at the intensity of which determines the concentration of H<sub>2</sub>S [1].

### 2.3. Ambient air quality at the location of coal separation of Ibar mines

Sampling of total sedimentary matters was performed in the period from 23.03.2016. until 21.04.2016. Sampling of sulfur dioxide was carried out in the period from March 23.2016. until 29.03.2016. and the nitrogen dioxide sampling was carried out in the period from 30.03.2016. to 05.04.2016. Due to the need for sampling of total waves, two measuring points are located, measuring point 1 and measuring point 2. Measurement point number 1 is located south-west from separation at a distance of about 200 m (in the yard of the Radeta family, GPS position: N: 43 ° 23'23.04 "E: 20 ° 38'52.67", altitude: 391 m). Measuring point number 2 is located south-east of separation at a distance of about 110 m (in the garden of Dragoljub Milanović, GPS position: N: 43 ° 23'30.81 "E: 20 ° 39'03.46", altitude: 389 m) [4]. Due to the need to sample nitrogen dioxide and sulfur dioxide, one measuring point is located, measuring point for NO<sub>2</sub> and SO<sub>2</sub>. It is located on the west side of the separation (on the outside of the building where the sampling laboratory is located, GPS position: N: 43 ° 23'29.64 "E: 20 ° 38'56.80", altitude: 386 m) . The measurement procedure included the following: location, sedimentation, GPS positioning, sampling in a given time period, sample transport to the laboratory, and chemical analysis. Model analysis: PH204L; Serial number: B121143291; Inv.: 64025; Measurement range: 0-220 g) and UV-VIS spectrometer (Manufacturer: PERKIN ELMER; Model: Lambada 2; Serial number: 142014; Inv. Number: 64024; Measuring range: 190-1100 nm) [4].

## 3. MEASUREMENT RESULTS

### 3.1. The level of air pollution measured in settlements in the vicinity of the tailing dumping site

The level of the air pollution in settlements in the vicinity of the dumping site was monitored in February 1995. Measured values of the concentration of sulfur dioxide and soot for the investigated period are shown in Table 1 for measuring stations MS-1-Health Center, MS-2-Lucia and MS-3-Whistle.

**Table 1:** Results of the measurement of the immission of sulfur dioxide (SO<sub>2</sub>) and soot on stationary cells for the period from 23th until 28th February 1995 [1]

Date	Measuring station					
	Baljevac Community Health Centre		Lučica village House of Žika Stefanović		Piskanja village House of Brana Kučević	
	SO <sub>2</sub> (max. 150 µg/m <sup>3</sup> )	Soot (max. 50 µg/m <sup>3</sup> )	SO <sub>2</sub> (max. 150 µg/m <sup>3</sup> )	Soot (max. 50 µg/m <sup>3</sup> )	SO <sub>2</sub> (max. 150 µg/m <sup>3</sup> )	Soot (max. 50 µg/m <sup>3</sup> )
23.02.1995.	0,05	8,5	0,08	14,2	0,19	29,6
24.02.1995.	0,00	4,2	0,06	10,6	0,26	34,2
25.02.1995.	0,10	16,8	0,15	21,3	0,44	30,8
26.02.1995.	0,00	0,0	0,24	28,2	0,56	41,4
27.02.1995.	0,00	0,0	0,00	0,0	0,28	0,0
28.02.1995.	0,03	5,3	0,00	5,8	0,82	39,6

The content of sedimentary matter, soluble and insoluble measured in the continuous monthly interval [1], was not established. The concentrations of hydrogen sulphide and carbon monoxide measured in short-term samples are given in Table 2.

**Table 2:** Results of the measurement of the hydrogen hydrogen sulphide (H<sub>2</sub>S) and carbon monoxide (CO) imission on stationary cells for the period from 23th until 28th February 1995 [1]

Date	H <sub>2</sub> S (max. 50 µg/m <sup>3</sup> )			CO (max. 10 000 µg/m <sup>3</sup> )		
	Measuring station			Measuring station		
	Baljevac	Lučica	Piskanja	Baljevac	Lučica	Piska nja
23.02.	2,86	5,86	6,93	0	550	730
24.02.	0,93	4,7	4,8	600	470	670
25.02.	0	0	0,93	0	0	0
26.02.	1,2	1,6	5,2	190	590	730
27.02.	0	0	0	0	0	0
28.02.	4,3	7,7	9,2	900	940	950

### 3.2. Determination of the level of total sedimentary matters, sulfur dioxide and nitrogen dioxide in the atmosphere of the coal separation environment

The level of total sedimentary matters, sulfur dioxide and nitrogen dioxide in the atmosphere of the coal separation of the Ibar mines in Baljevac was monitored in the period from 23<sup>rd</sup> of March 2016 until 21.04.2016.

The results of the determination of total sedimentary matters are shown in Table 3 for measuring stations measuring point 1 and measuring point 2. The sampling design for the measuring point 1 is TA.0068.I, and for measuring point 2 is TA.0069.I.

**Table 3:** Results of determination of total sedimentary matters [4]

Ordinal number	Parameter	MDV	Sample mark	
			TA.0068.I	TA.0069.I
1.	Total sedimentary matter (µg/m <sup>3</sup> )	450	192,21±22,6%	198,01±22,6%

The results of the determination of the sulfur dioxide concentration are shown in Table 4 for the measuring station a measuring point for SO<sub>2</sub>. The designation of samples of sulfur dioxide is TA.0070.I, TA.0071.I, TA.0072.I, TA.0073.I, TA.0074.I, TA.0075.I and TA.0076.I.

**Table 4:** Results of determination of sulfur dioxide [1]

Date	Sample mark	Measured 1hour concentration of sulfur dioxide (SO <sub>2</sub> )	
		GVI	Measured values (µg/m <sup>3</sup> )
23.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0070.I	350 µg/m <sup>3</sup>	341,52
24.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0071.I		329,81
25.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0072.I		331,25
26.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0073.I		342,54
27.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0074.I		308,74
28.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0075.I		319,54
29.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0076.I		329,54

The results of the determination of the concentration of nitrogen dioxide are shown in Table 5 for the measuring station a measuring point for NO<sub>2</sub>. The designation of nitrogen dioxide samples is TA.0077.I, TA.0078.I, TA.0079.I, TA.0080.I and TA.0069.I.

**Table 5:** Results of determination of nitrogen dioxide [4]

Date	Sample mark	Measured 1 hour concentration of nitrogen dioxide (NO <sub>2</sub> )	
		GVI	Measured values (µg/m <sup>3</sup> )
30.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0077.I	150 µg/m <sup>3</sup>	98,33
31.03.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0078.I		138,52
01.04.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0079.I		121,26
02.04.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0080.I		103,34
03.04.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0081.I		136,73
04.04.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0082.I		121,28
05.04.2016., 12 <sup>h</sup> -13 <sup>h</sup>	TA.0083.I		114,21

#### 4. CONCLUSION

The measured and tabulated values of the immission of the observed pollutants: sulfur dioxide, soot, hydrogen sulphide and carbon monoxide, as well as total sedimentary matters were in all cases less than the prescribed emission limit values, which indicates that in the observed period in February 1995, did not significantly affect the quality of air in the environment. At the time of carrying out these measurements at the landfill, there were not visually registered phenomena of fire processes, since the entire surface of the landfill was covered with a layer of tailings before performing the measurement.

Measures in the period from 23.03.2016. until 21.04.2016. comparing the measured values of total sedimentary matters with the maximum allowed values for total sedimentary matters (Regulation on conditions for monitoring and air quality requirements, SL Glasnik RS No. 11/2010, Decree on Amendments to the Regulation on the Conditions for Monitoring and Air Quality Requirements SL Glasnik RS No. 75/10, Annex XV, Section A, Item 5 and Decree on Amendments to the Regulation on Monitoring Conditions and Air Quality Requirements, SI Glasnik RS, No. 63/13), it can be concluded that the measured values of total sedimentary matters at the specified measuring points at the site of coal separation of the Ibar mines in Baljevec do not exceed the prescribed maximum permissible values of total sedimentary matters for the specified time period. Comparing the measured values of sulfur dioxide and nitrogen dioxide with limit values (Regulation on conditions for monitoring and air quality requirements, SI Glasnik RS No. 11/2010, Decree on Amendments to the Regulation on the Conditions for Monitoring and Air Quality Requirements No. 75/2010, Annex X, Section B, Item 1 and the Regulation on Amendments to the Regulation on Monitoring Conditions and Air Quality Requirements, SI Glasnik RS No. 63/13), it can be concluded that the measured values of sulfur dioxide and nitrogen dioxide at the specified measuring location at the location of coal separation of Ibar mines in Baljevec are below the prescribed limit values for the specified time period.

By examining the overall results of pollutants by measuring the immissions in the vicinity of the tailing dumping site and testing the ambient air quality at the site of coal separation of the Ibar mines in Baljevec, it can be said that the exploitation of coal in Ibar mines has no adverse impact on the health of the population.

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## SAFETY OF PRIMARY HEALTHCARE CENTERS IN NATURAL DISASTERS: OBRENOVAC FLOODS CASE- STUDY

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**Abstract:** *Floods represent the most commonly occurring natural disaster in the last 20 years, most probably due to climate changes in the World. Beside direct danger and casualties caused by floods, more attention is being given to disturbances in primary healthcare services provided in the affected areas and the influence of these disasters on chronic patients. The World Health Organization has developed and validated the Hospital Safety Index (HSI) as a tool for the evaluation of the safety of Hospitals, but no tool exists for the safety evaluation of primary healthcare centers (PHC). The aim of this paper was to present the results of the safety assessment of the Primary Healthcare Center in Obrenovac and to discuss the important points of the HSI in this setting considering the Obrenovac floods of 2014. With some modifications, the HSI could present a useful tool for the evaluation of PHCs and disaster risk reduction.*

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**Keywords:** *disaster risk reduction, healthcare, hospital safety index, primary healthcare services.*

### 1. INTRODUCTION

Defining an event as a disaster does not depend solely on the natural characteristics of the said event. A disaster is the result of the interaction of a hazard with the physical, social, economic, and environmental vulnerabilities and exposure of the affected population[1]. Generally, an unforeseen event that causes great damage, destruction, and human suffering is considered a disaster. And important part of this definition is that this event usually overpowers the existing capacity of the local actors and requires external assistance. There are three broad groups of disasters offered by the United Nations' International Strategies for Disaster Risk Reduction, namely technological disasters, manmade disasters, and natural disasters. Although technological disasters necessarily involve human activities, they are separated from manmade disasters by the factor of “decision” or “plan” – technological disasters include industrial incidents, such as collapses of industrial infrastructure, fires, and chemical spills, as well as major transport accidents, while

manmade disasters include economic crises and various types of violence, such as terrorism, riots, and war [2]. A group of disasters excluding the influence of human activities, although it has been argued otherwise, are natural disasters which are broadly divided into hydrometeorological disasters, geophysical disasters, and biological disasters. **Table 1** shows the subcategories of these three groups of disasters.

**Table 1:** Main categories and subcategories of natural disasters

Hydrometeorological disasters
Flood
Storm
Drought
Geophysical disasters
Earthquake
Tsunami
Volcano activity
Biological disasters
Epidemic
Insect infestation

At the time of the preparation of this manuscript, the most recent storm had hit Serbia at the end of June 2018 causing floods, traffic and transportation problems, damaging buildings and endangering lives of the local population of Vojvodina. The biggest and most recent earthquake in Serbia was the one hitting Kraljevo in 2010, causing the death of 2 people and severe damage to buildings in this city and the surrounding area. The most recent epidemic in various regions of Serbia, but also Europe, is the measles outbreak attributed to the reduction of vaccination of children in the last decades. Some estimates put the economic loss due to disasters around the world, only for the period between 2000 and 2012, to around 1.3 trillion dollars. Disasters affect all socioeconomic groups, institutions, and sectors, destroying the economic development gains around the world. More than 700 thousand people around the world have lost their lives due to disasters in the period mentioned above, with more than 1.5 billion, including women and children, affected in many ways [1]. Although aggressive and catastrophic events, such as tsunamis and earthquakes, draw much of the media attention, floods are considered the most common natural disaster in the world [2, 3]. The number of floods has been rising, mostly due to the climate changes, and it has been estimated that there have been more than 170 flood per year in the last decade [5]. Drowning causes the majority of deaths during a natural disaster such as a flood. The rest are caused by various reasons, such as physical trauma, fire, or electrocution. Equally important effects of a natural disaster can be described as indirect or chronic effects. After the first or the strongest “wave” of a natural disaster has passed, the population can remain affected in many different ways. Chronic patients are believed to be the most affected, on one hand due to their prolonged and frequent need for the medical attention, and on the other hand due to the increased need of other people seeking medical attention due to respiratory problems, infections, headaches, skin irritations, hypothermia, as well as injuries. Considering the aging of the population, especially in Europe, including Serbia, it is necessary to develop disaster planning for chronic patients [6]–[10]. These patients depend mostly on primary healthcare centers. *The aim of this paper was to demonstrate the need and define the steps necessary to develop a tool for the safety evaluation of primary healthcare centers and underline their role in Disaster Risk Reduction.*

## 2. Methods

### 2.1 The setting

In May 2014, a low-pressure system named “Yvette” caused heavy rains to fall on Serbia. More than 200 mm of rain fell on Western Serbia in a week, which was equivalent to 3 months of rain under normal conditions, causing a rapid and substantial increase in water levels of main rivers in this area, among which Sava river. Sava river basin received the most of the rainfall which resulted in flash floods in the tributaries where water levels rose almost immediately after the onset of the rain. The widespread flooding affected the rural areas around Šabac, but also the urban areas, particularly in Obrenovac. **Figure 1** shows the flooded parking lot of the Obrenovac Primary Healthcare Center. In Serbia, municipalities own health centers, which provide primary care for the population on their territory, while the Ministry of Health owns hospitals and clinical centers which provide secondary and tertiary care. The health center in Obrenovac was founded in 1952, and its first director was Dr. Rista Purić, who had studied medicine in Paris and Geneva. He has was as the organizer of the first delivery room in Obrenovac, he gave the first BSG vaccine and was ordained for his dedication to the people. The health center consists of three main buildings (A, B, and C) with another one (D) under construction. This health center’s services cover 29 smaller towns and an area of 410 km<sup>2</sup>, with the most distant village 33 km away. Forty years ago, Obrenovac had a population of 53,200 people, while the health center employed 120 health care workers (doctors, nurses, and technicians). Today, Obrenovac has a population of 75,000 people, and the health center employs 337 health care workers, of which 113 are medical doctors.



**Figure 1:** Flooded parking lot of the Obrenovac Primary Healthcare Center

### 2.2 Hospital Safety Index

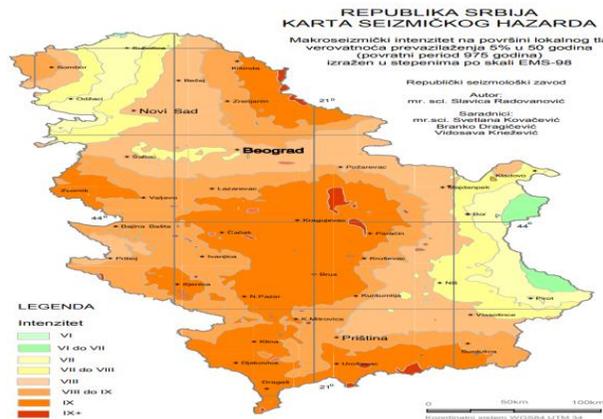
The Hospital Safety Index (HSI) has been developed by the Pan American health Organization, a branch of the World Health Organization, and represents a rapid and reliable tool for a cost-effective diagnostic of a hospital’s safety [10, 11]. It includes modules on structural safety, non-structural safety, and functional capacity, with more than 150 questions (areas of inquiry) which are all attributed a safety level, namely Low = “Unlikely to function”, Average = “Likely to function”, and High = “Highly likely to function”. The total score for the healthcare facility can be in one of the three classifications regarding safety:

- **Classification A:** Considered to be able to safely continue their activities in case of disasters (safety index 0.66-1.00)
- **Classification B:** Considered to be able to resist against a crisis, but their equipment and vital services are exposed to danger (safety index 0.36-0.65)

- **Classification C:** Considered to be unsafe for people working there and patients in crisis, requiring urgent intervention measures (safety index 0.00-0.35)

### 3. Results and Discussion

The overall safety of the Obrenovac Primary Healthcare Center was 0.82, putting it into the A category for safety. Facilities with this grade of safety are considered to be able to safely continue their activities in case of disasters. In the structural safety module, used to assess the structural elements such as columns, beams, walls, and floor slabs, the Obrenovac PHC scored 0.95, underlining the building’s integrity and possibility of safely using it in natural disasters. In the nonstructural safety module, consisting of architectural safety, infrastructure protection, access, and physical security, critical systems, and equipment and supplies, the PHC scored 0.74. Finally, in the emergency and disaster management, the PHC achieved a score of 0.75. The HSI, together with a detailed description of the PHC’s functioning during the 2014 floods has allowed us to identify several points of improvement. Investments in the buildings and infrastructure would allow the structural and nonstructural safety score to remain high, and guarantee safety for the staff and patients in the hospital building during a disaster. The backup water and electricity supply systems need most consideration, as having a 72 hour uninterrupted supply is considered a “must” in case of disaster. In the area of emergency and disaster management, several fields such as hazard-specific sub plans, and various procedures used to activate and deactivate them. Finally, in the absence of an internationally recognized tool for safety evaluation of primary healthcare facilities, the Hospital Safety Index has proven a valuable tool which can help guide the discussion about the safety of a PHC. Our research has shown that most of the questions are applicable in a similar way to hospitals, as well as PHCs, although several categories and items deserve a less prominent role in PHC evaluation, due to the different role these two types of facilities have in providing healthcare services. Hydrometeorological disasters have become more frequent in the world, as well as in Serbia. Additionally, Serbia, as well as some of the countries of the region, have been affected by the earthquakes, which must be taken in consideration. **Figure 2** shows the surface macroseismic intensity in Serbia. It puts the area around Kragujevac, Čačak, Paraćin, Kruševac, Brus, and Novi Pazar in the 9<sup>th</sup> (IX) group of intensity (Map of seismic hazard of the Republic of Serbia, Seismological Institute of Serbia).



**Figure 2:** Map of seismic hazard of the Republic of Serbia

Source: [http://www.seismo.gov.rs/Seizmicnost/Povratni%20period-975\\_lokalno\\_tlo\\_l.pdf](http://www.seismo.gov.rs/Seizmicnost/Povratni%20period-975_lokalno_tlo_l.pdf)

#### 4. Conclusions

Many regions of Serbia are still suffering from the consequences of various natural disasters which occurred in the recent and more distant history. Having in mind that the extent of a disaster depends on the readiness of a system to react to a natural hazard, it is our obligation to invest time and effort in disaster risk reduction. Evaluating the safety of hospitals, especially in the primary zones affected by disasters, but also developing methods for efficient evaluation of primary healthcare facilities represents an important step in the long road to uninterrupted healthcare in emergencies and disasters.

#### 5. Acknowledgments

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## TRAINING FOR PARTICIPATION IN MULTINATIONAL MARITIME OPERATIONS: LIFESAVING AT SEA

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**Abstract:** *The paper presents a developed training system for persons to participate in multinational maritime operation: lifesaving at sea. The Military Academy has developed a training system in line with international standards and regulations. Members of the armed forces of the Republic of Serbia actively participate in the mission of the European Union ATALANTA in the Indian Ocean, and participation in the SOPHIA operation is also planned. The aim of this operation is to control maritime migrant routes that go through the Mediterranean Sea, as well as suppress the smuggling of people and help shipwreckers. The training program for those who are referred to these multinational maritime operations in cabinets, training areas and ship simulators at the Military Academy results in the optimal application of onboard procedures and emergency procedures. The training program is in line with all conventions of the International Maritime Organization and models of maritime training courses.*

**Key words:** *lifesaving at sea, training system, migrants, multinational maritime operations*

### 1. MIGRANT PROBLEM - LIFESAVING AT SEA

The world's most dangerous migrant routes pass through the Mediterranean Sea. Many of these attempt to cross the sea have tragically ended. In 2015, over one million migrants crossed the Mediterranean Sea to reach Europe. In 2016 only, more than 5000 migrants lost their lives in the Mediterranean Sea. [1] During 2017, at least 3,119 persons died or went missing in the Mediterranean Sea [2]. According to data reports by the International Organization for Migration (IOM), from January to August 2018, 60,309 migrants and refugees have entered Europe by sea and 1,524 people lost their lives on the Mediterranean Sea [3]. It often happens that many ships and boats during migrants and refugees transportation occur shipwreck in the Mediterranean Sea. It happens especially because in such cases the standards that define the total number of passengers the ship can carry, nor the lifesaving equipment that is standardized in relation to the capacity of the crew and passengers, are not in comply with the regulation. There are a lot of initiatives and projects for proactive approach to improve safety of migrants and shipwreck problem in the Mediterranean Sea [4]. Analyzing the data and the huge fluctuation of people who are being transported, especially the large number of victims, important segment of this training is a proper approach to lifesaving appliances at sea and knowledge of all techniques and prescribed measures. Saving life at sea is as old as sailing. From the first experiences and accidents that happened during the sailing, people have developed different rescue techniques, gained knowledge of favorable and unfavorable aspects of rescue and environmental condition, the functioning of the human organism and means of lifesaving. Military Academy has developed a unique training system for people who are engaged in lifesaving at sea. Training system consists of: using lifesaving equipment (personal and

collective), lifesaving drill, search and rescue (SAR) at bridge simulator and procedures for smuggling prevention onboard.

### 1.1. Lifesaving appliances

Lifesaving appliances are the basic elements of people's safety in cases of dangers on board. All lifesaving appliances are divided into: Personal Life-saving appliances; Survival Craft and Rescue boat; Launching and Embarkation Appliances and other equipment. The International Convention for the Safety of Life at Sea - SOLAS, the International Life-Saving Appliance Code (LSA Code) and national regulations determine the number of lifesaving appliances for safety at sea. Lifesaving appliances depend of ship size, number of crew members and passengers. [5]

#### Personal Life-saving appliances – life jackets

The life jacket is personal rescue and survival tool at sea and a rescue symbol of shipwrecker. Each ship must have at least the sufficient number of life jackets for both crew and passengers. In addition, each ship must have an additional number of life jackets for all crew members on guard and sufficient number of life jackets on remote stations near the rescue and survival crafts. Often it happens that ships or boats do not have lifesaving appliances, have inadequate or insufficient lifesaving appliances during the smuggling migrants and refugees.

It is necessary to know and to practice proper way of using personal lifesaving appliances. All crew members and the passenger must learn how to wear a life jacket after boarding the ship. In general, every life jacket should be pulled over the head, firmly attached to the body and properly fitted [6].



Picture 1: Properly fitted life jacket

*Source: Authors' picture.*

## 2. TRAINING FOR LIFESAVING AT SEA

Rescuing represents a very delicate stage of shipwrecks and, as mentioned, at this stage a shipwreck is threatened by multiple risks. Risks that may appear during a shipwreck are widespread: injuries on board, which can be mechanical and thermal; drowning; choking in oil, grease and other dangerous liquids that come from pierced tanks; burns of inflammable liquids, spilled over the sea surface; danger of cold or heat; danger from sharks, etc. Lifesaving must be a process not a coincidence or good luck for individuals, and its success should depend on: training, drill of lifesaving, and individual and collective equipment

available for rescuing. Understanding the conditions in which the shipwreck finds itself is an important prerequisite for a successful rescue. [7]

The training aims to understand the measures that are needed to implement, in order to have an individual equipped with personal lifesaving appliances, to ensure that it provides assistance to those at risk, help the helpless, and use of collective lifesaving appliances. The essence of this training is in fact technical and moral education in lifesaving at sea. Training includes: details that lead to shipwrecks; learning about the dangers that endanger life in the rescue phase; training for the use of personal lifesaving appliances; swimming training with lifesaving appliances, swimming training in rescue conditions and swimming training in conditions of a turbulent sea, and in conditions with a fire on the sea surface; training in boarding the raft or boat and use of available equipment; first aid with the knowledge of cardiopulmonary resuscitation at every situation: in the water, in a boat, on a raft; as well as the necessary knowledge of survival methods at sea in different conditions and different areas of the earth [7].

Based on the risks related to abandoning of ship, as well as the dangers that may affect shipwrecks, a systematic training plan is developed for persons embarking on ships carrying out rescue action at sea. The training plan is based on theoretical knowledge and knowledge of the human organism, experience acquired in practice, as well as the provisions of the International Convention for the Safety of Life at Sea (SOLAS), and in particular the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended 1995 - STCW 78/95 and STCW 10 of Manila [8].

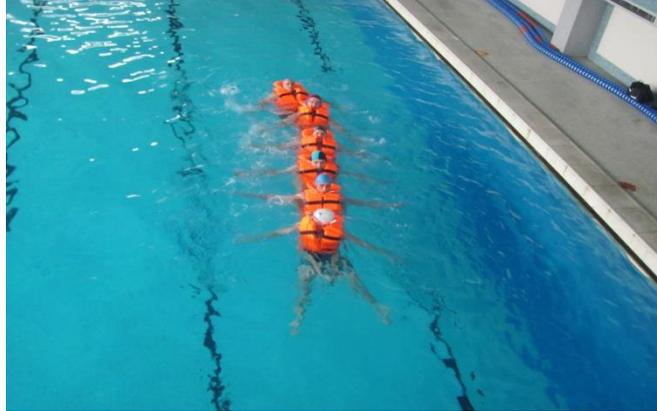
Part of the training is also a personal and collective rescue techniques at the pool. The exercise consists of interconnected activities that are very important for successful rescue of people at sea and emergency response. During the exercise, instructor practically demonstrates the correct fitting life jacket; shows the proper abandonment the boat by jumping into the water; shows the procedure of shipwreckers when the surface of the water is burning fluid; demonstrates to the candidates the gathering and actions of shipwrecks in the water outside the collective lifesaving appliances. Instructor also shows the HELP position (Heat Escape Lessening Posture), which protects the person in water from hypothermia. [9] If more people are in the water, it is recommended that they group in a circle facing inside part of the circle. This is the so-called, a HUDDLE position that will, in addition to keeping group together, enable rescue teams to find shipwrecks more easily.



Picture 2: Huddle position

*Source: Authors' picture.*

In difficult weather conditions, it is very difficult to maintain these two positions. In that case, survivors should, if possible, keep their backs on the wind and waves to protect their face against wind and wave. The alternative position of the aforementioned Huddle is the so-called Crocodile or Chain position, so that everyone can turn in the same direction. It is very important to prevent hypothermia to preserve all the clothes, especially on hands and feet.



Picture 3: Crocodile or Chain position

*Source: Authors' picture.*

In the final phase of the rescue exercise, candidates must enter in collective lifesaving appliances. The instructor emphasizes that due to the danger of waves rejecting shipwrecks from rafts or boats, it is important to catch the outside rope of the so-called life line. Also, the instructor shows how to get into the life raft properly, and how to help a person in the water to aboard life raft. Candidates repeat those activities several times to obtain the proper routine and regularity of the procedure itself. [10]

Persons trained in multinational maritime operations are also acquainted with trainings on the proper procedures for receiving calls and messages on the accident. Ships that are in a course according to the position of a ship in trouble are obliged to prepare for rescue both the ship, as well as the people on it. The importance of proper and timely preparation on board is invaluable for the successful implementation of rescue. People are practically trained to make preparations on board which include a series of actions [11]:

- Mounting the rope along the side of the ship for the victims of the craft to facilitate landing and mooring of vessels, boats and liferafts,
- Preparation on one side of the davit, for lifting on each side of the ship, together with a cargo platform or rope network, for emergency rescue of the injured and injured persons in the water,
- Installation of lifting ropes, ladders and grids,
- Crew members should preferably be equipped to jump into the water and help survivors,
- Preparation of boats and boat life rafts for eventual use as shipboards,
- Preparations for the reception of survivors requiring medical assistance, including the preparation of stretchers and first aid boxes.

Training for such participation can be partly performed on ship simulators. In simulated conditions, trainees are given the task of finding people who have experienced shipwreck. The Military Academy further develops a ship simulator to provide the highest quality knowledge necessary for the successful performance of assigned duties. In cooperation with the Peacekeeping Operations Centre of the Serbian Armed Forces personnel, training is

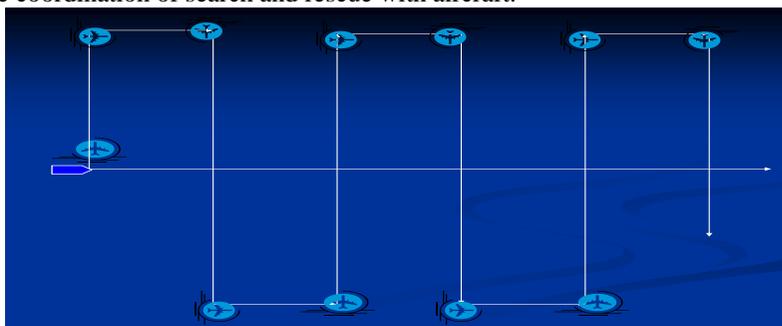
carried out before sending them to the tasks performing and embarking on ships for the abovementioned missions. A good example of this training system is the training of the Serbian Autonomous Vessel Protection Detachment that is deployed to the EU Operation ATALANTA. [12]



Picture 4: Search and rescue training on bridge simulator

*Source: Authors' picture.*

IAMSAR Manual International Aeronautical and Maritime Search and Rescue Manual is a prerequisite for the launch of the search and rescue action. Much of the training is carried out on a simulator where attention is paid to the practical application of search and rescue patterns and the techniques of spotting shipwrecks in the sea. [13] Also, part of the training is based on the coordination of search and rescue with aircraft.



Picture 5: Display model of search and rescue action of ship-aircraft

*Source: Radojević, S. (2013): Sigurnost i bezbednost plovidbe. Beograd: Medija centar "Odbrana", p. 133*

In addition to training in rescuing persons who are referred to multinational maritime operations, they are trained in ship search techniques in order to counter the attempts to smuggle people. In this field of training, techniques and methods applied by the Coast Guard and border police of the United States, the United Kingdom and the EU Member States [14].

### 3. CONCLUSION

Numerous shipwrecks have marked the history of navigation, and despite substantial technological progress, unfortunately they are also common nowadays. The Mediterranean Sea is a 'maritime cemetery', as many ships and boats during migrants and refugees transportation occur shipwreck. A large number of human lives have been lost due to the

lack of knowledge of medical and technical aspects of rescue. At the Military Academy, basic training in techniques and proper rescue procedures is carried out. Such trainings are conducted for professional members of the Army who are deployed in multinational maritime operations. In this way, the best training is performed for future crew members and embarked crewmen for the proper treatment in the case of saving people at sea. In emergency situations, during shipwreck or abandonment of the ship, or in situations that can not be avoided, only proper training can help us save lives. Taking into account the fact that such situations mostly occur under bad weather conditions, special training and rationality are necessary. Taking into consideration reality on the ground and possible further use of migrant routes to the Mediterranean Sea, while respecting human principles of integrity of human life, training for life saving at sea is an imperative in further approach to supporting multinational operations of members of the armed forces of the Republic of Serbia. Military Academy has developed a unique training system for people who are engaged in lifesaving at sea. Training system consists of using lifesaving equipment (personal and collective), lifesaving drill, SAR action at bridge simulator and procedures for smuggling prevention onboard. The Military Academy will continue supporting the deployment of members of the armed forces in such operations, and in cooperation with other training centers, will perform the best possible preparation of all members for future operations.

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## SAFETY AND HEALTH AT WORK AS A SIGNIFICANT SEGMENT OF THE SLOVENIAN POLICE IN ELABORATION OF ACTIVITY PLANS IN THE SYSTEM OF PROTECTION AGAINST NATURAL AND OTHER DISASTERS

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**Abstract:** *The article presents the system of protection against natural and other disasters in the Republic of Slovenia and the involvement of the Slovenian Police as a body within the Ministry of the Interior of the Republic of Slovenia in the system of protection against natural and other disasters with protection and rescue plans and plans for activities in case of natural and other disasters.*

*In order to be successfully implemented by the Police, activity plans in the system of protection against natural and other disasters must be based on the basic safety provisions of occupational safety and health for police officers from the Safety statement with risk assessment of the Ministry of the Interior of the Republic of Slovenia.*

*These two areas necessarily connect and represent the basis for a successful overall Police operation in case of natural and other disasters.*

**Keywords:** *activity plans, Police, protection and rescue plans, risk assessment, safety and health at work, system of protection against natural and other disasters.*

### 1. INTRODUCTION

Sources of threat in the modern international environment are very diverse and take shape in the form of military and non-military threats.

In order to ensure national security, the Republic of Slovenia has a national security system in place to ensure a consistent and timely response by the state to the full range of modern sources of threat and threat of national security.

The national security system of the Republic of Slovenia is based on the operation of three subsystems, namely the defence subsystem, the internal security subsystem and the subsystem of protection against natural and other disasters [2].

The defence system form the military defence provided by the Slovenian Armed Forces and the non-military part of the defence system, thus representing a whole set of mechanisms that guarantee the security of the state in the area of defence.

The internal security system is made up of institutional holders of security tasks, including judicial and other state bodies and institutions. Their task is to contribute to the internal stability and security.

The system of protection against natural and other disasters is intended to ensure the protection of people, animals, property, cultural heritage and the environment against natural and other disasters with the aim of reducing the number of accidents and preventing or reducing the number of victims and other consequences of these accidents. The system of

protection against natural and other disasters is linked to other subsystems of the national security system and is integrated into international mechanisms in this area.

In accordance with their competences, the national Police, as a body within the Ministry of the Interior of the Republic of Slovenia, take part in the system of protection against natural and other disasters, namely at the level of local communities, regions and the state.

The Ministry of the Interior of the Republic of Slovenia is a part of the internal security system. Its basic mission is to provide the highest level of security in the state. With its basic role and task, all working areas of the ministry are connected.

## **2. THE PROTECTION SYSTEM AGAINST NATURAL AND OTHER DISASTERS IN THE REPUBLIC OF SLOVENIA**

The living environment is endangered by many natural and other disasters.

From the point of view of protection against natural and other disasters, we consider the main sources of hazard and threat are earthquakes, floods, inundation, landslides, rock falls, abundant snowfall, avalanches, erosion, thunder storms, storms and strong winds, drought, frost, sleet, hail, wild fires, epidemics of infectious diseases, epidemics of animal infectious diseases; technical, technological and other disasters such as, for example, accidents in mines, disasters involving hazardous substances, nuclear disasters and other radiological hazards, road accidents, railway accidents, offshore accidents, aviation accidents, drownings, leisure accidents, military threats, terrorism and mass migration of the population. The system of protection against natural and other disasters in the Republic of Slovenia is adapted to these forms of threats. The system of protection against natural and other disasters is a normative, organisational, functional and supervisory unified and comprehensive system for the protection of people, animals, property, cultural heritage and the environment, which operates in peace and in all changed conditions, including in the state of emergency and war.

The basic tasks of this system are the detection, monitoring and investigation of the risks of natural and other disasters; prevention of natural and other disasters; alerting, warning and alarming about emerging threats and providing guidance for protection, rescue and assistance; education and training for protection, rescue and assistance; organisation of civil protection and the establishment and maintenance of other forms of preparedness for protection, rescue and assistance; self-protection, self-aid and mutual assistance; mobilization and activation of forces and means of protection, rescue and aid; ordering and implementing protective measures; rescue and assistance; eliminating and reducing the consequences of these accidents, providing basic living conditions and monitoring the implementation of regulations on the protection against natural and other disasters [3].

The system of protection against natural and other disasters includes all forms and activities relevant for the prevention of accidents and mitigation of their consequences. Within the framework of their competences, rights and responsibilities, the system includes citizens, societies and other non-governmental organisations that carry out activities relevant to the protection against natural and other disasters, public rescue services, companies, institutions and other organisations, state bodies and local communities. Civil protection is a purpose-organised part of the system of protection against natural and other disasters in order to perform protection, rescue and assistance tasks. In performing their duties of protection, rescue and assistance, the Police and the Slovenian Armed Forces cooperate within the scope of their competences [4]. The constant and direct threat of natural and other disasters requires mutual cooperation of the countries and common action within international organisations. The purpose and objectives of this cooperation are especially the prevention of risks and accidents; mutual support in developing and strengthening the preparedness of states to cope with natural and other disasters; the provision of mutual assistance in case of accidents and to ensure the conditions for cooperation in international humanitarian and rescue operations.

### **3. PLANNING OF PROTECTION, RESCUE AND ASSISTANCE**

In the field of protection against natural and other disasters, we distinguish development and operational planning. The planning bases are the threats, the degree and the type of threat, technical and technological possibilities of prevention and protection and rescue, the experience gained from the accidents in the past and other. Development planning is represented by a national programme and an annual plan for the protection against natural and other disasters, while operational planning includes protection and rescue plans.

The Ministry of the Interior of the Republic of Slovenia is involved in both types of planning; in development planning through inter-ministerial cooperation in the preparation of documents at the state level, and in operational planning through the preparation of concrete plans for operation in case of natural and other disasters at the level of the state, region and local community.

#### **3.1. Protection and rescue plan**

The protection and rescue plan is a breakdown of the idea of protection, rescue and assistance in the event of a natural or other disaster. The plan shall determine the responsibilities and tasks of the plan's implementing contractors in providing protection, rescue and assistance. Protection and rescue plans are based on threat assessments and proposals for protection, rescue and assistance arising from these assessments, as well as the available forces and resources for protection, rescue and assistance. Protection and rescue plans are prepared individually for each type of an accident. Protection and rescue plans are drawn up by the state, municipalities, companies, institutions and other organisations. National protection and rescue plans are elaborated by the Administration of the Republic of Slovenia for Civil Protection and Disaster Relief in cooperation with ministries and other state bodies and relevant professional organisations. National plans are elaborated for action in the event of an earthquake, flood, aviation and railway accidents, offshore accidents, accidents involving dangerous substances, including accidents with sources of ionizing radiation, in case of other disasters that could affect most of the country or cause extensive consequences, and war. National protection and rescue plans are further elaborated at the regional level. The protection and rescue plan comprises a plan, along with appendices and annexes to the plan.

#### **3.2 Activity plans**

Activity plans are appendices to national protection and rescue plans. They are elaborated by the competent authorities or departments of the municipal administration and the competent ministries and other state bodies. The activity plans provide for the implementation of activities within the competence of the authority or service. They define the task holders, the organisation of their activities, measures to reduce the consequences of a disaster and the way of performing the tasks. They shall also determine the necessary material, financial and other means for carrying out the tasks. The activity plans are approved by the head of the body or service. Activity plans as appendices to national plans should as a rule include guidelines for the organisation and implementation of activities at the regional or local levels.

### **4. INVOLVING THE POLICE IN THE SYSTEM OF PROTECTION AGAINST NATURAL AND OTHER DISASTERS**

As a body within the Ministry of the Interior, the national Police are involved in the system of protection against natural and other disasters, which is organised in the Republic of Slovenia as a uniform system at the national, regional and local levels.

At the national level, the Police participate in the preparation of legal and other bases that define the field of protection against natural and other disasters.

Thus, in the framework of inter-ministerial activities, the Police participate in the preparation of sectoral legislation; they participate in the preparation of national protection and rescue plans for various natural and other disasters; they participate in the preparation, organisation and implementation of national and international exercises in the field of protection, rescue and assistance; they participate in the preparation and organisation of trainings, conferences and workshops on the topic of natural and other disasters.

For the purpose of its own operation in the event of natural and other disasters, they prepare activity plans in case of natural and other disasters and provide guidelines for action at the regional level. With plans, they determine task holders, the organisation of their activities, measures to reduce the consequences of a disaster and measures of occupational safety and health. They also provide the necessary material, financial and other means for carrying out the tasks.

In the case of large-scale disasters, they cooperate with other state bodies and coordinate tasks at the state level. In doing so, they mainly cooperate with the Administration of the Republic of Slovenia for Civil Protection and Disaster Relief, the Ministry of Health, the Ministry of Transport, the Slovenian Armed Forces and other organisations (institutes, organisations, companies, etc.).

At the regional level, the regional organisational units of the Police, i.e. police directorates, are involved in the system of protection against natural and other disasters. Police directorates prepare plans for activities in case of natural and other disasters for their area of work and prepare guidelines for work at local level; they participate in the preparation and implementation of national, regional and local exercises in the field of protection, rescue and relief; they participate in the preparation and implementation of trainings, conferences, and preventive activities (participation in fairs and workshops). In the case of natural and other disasters in their region, concrete activities are carried out in interventions.

In doing so, they cooperate with other intervention agencies, such as firefighters, rescuers and other protection, rescue and relief forces (civil protection units and civil protection services, mountain rescue workers, speleologists, cynologists and others), the departments of the Administration of the Republic of Slovenia for Civil Protection and Disaster Relief and other organisations from their territory. Representatives of police directorates cooperate in regional headquarters for Civil Protection.

At the local level, local police units, i.e. police stations, take part in the protection, rescue and relief system. Police stations first intervene in protection, rescue and assistance interventions, and cooperate with other local intervention agencies. Police stations also engage in preventive activities at the local level. Heads of police districts are involved in the work of municipal headquarters of the Civil Protection.

## **5. ACTIVITY PLANS OF THE POLICE IN THE EVENT OF NATURAL AND OTHER DISASTERS**

The Ministry of the Interior of the Republic of Slovenia elaborates activity plans in the event of earthquakes, floods, nuclear disasters, aircraft accidents, railway accidents, wild fires, the massive occurrence of infectious diseases in animals and the use of weapons or means of mass destruction for terrorist purposes or terrorist attack with classic means. It plans its activities at national level and provides guidelines for the elaboration at the regional level.

The activity plans of the Ministry of the Interior of the Republic of Slovenia are made on the basis of national protection and rescue plans for specific disasters and represent an addition to the state plans. Their elaboration is determined by the Decree on the content and elaboration of rescue protection plans.

The activity plans are produced at the Ministry of the Interior of the Republic of Slovenia at several levels: at the state level, plans are elaborated by the Ministry of the Interior of the

Republic of Slovenia and some internal organisational units of the General Police Directorate; at the regional level, plans are elaborated by police directorates, and at the local level by police stations in the form of activity memorandum. Competent services of the ministry and the Police are in charge of the elaboration of activity plans; these services also take care of familiarizing all employees with the content of the plans. This takes place through announcements on internal links and the Police intranet. To a certain extent, the activity plans are also published on the Ministry's website.

The content of the activity plan for an individual disaster includes:

- the definition of a disaster for which a plan has been elaborated,
- the scope of planning,
- the concept of protection, rescue and assistance in the event of a disaster for which a plan has been elaborated,
- the necessary forces and resources, and available resources,
- organisation and implementation of monitoring, notification and alerting,
- activation of forces and assets,
- administration and management,
- measures and tasks of protection, rescue and assistance,
- personal and mutual protection,
- explanation of terms and abbreviations.

The activity plans are the basis for work of individual internal organisational units of the Ministry of the Interior of the Republic of Slovenia in case of natural and other disasters. On the basis of changing threat assessments, contact and other data and experiences from specific accidents and protection and rescue exercises, plans are regularly updated, modernised and modified.

Activity plans in parts relating to the activation of certain forces and the implementation of individual tasks necessarily interfere with the scope of consistent implementation of occupational health and safety measures. The responsible services of the ministry and the Police are responsible for informing, educating and training the employees in terms of ensuring safety and health at work based on risk assessment through training, lectures, seminars, courses and publications. In the event of a disaster, they direct personal and reciprocal protection with appropriate instructions [1].

## **6. PROVIDING SAFETY AND HEALTH AT WORK IN SLOVENIAN POLICE IN CASE OF NATURAL AND OTHER DISASTERS**

The very basic principles of Slovenian legislation in the field of occupational safety and health are adopted on the basis of the European framework directive 89/391/EEC, which basically stipulate that the employer must implement the measures necessary to ensure the safety and health of workers, including the prevention of workplace hazards, information and training of workers, with appropriate organisation and necessary material and financial means.

A security statement with a risk assessment, which was adopted by the Ministry of the Interior of the Republic of Slovenia with the bodies of the Police and the Inspectorate for Internal Affairs in 2002 and its subsequent reviews, is a "live" document that can be defined as a comprehensive security system policy with which the employer undertakes in writing to implement all measures to ensure safety and health at work, to prevent risks and risks at work, to inform and train workers, to give instructions, to properly organize and to provide the necessary material resources for this purpose.

For all police posts, risk assessments are made, which are an integral part of the safety statement, where the identified hazards and harmfulness that may occur in the workplace of police officers, as well as measures to ensure safety and health at work are identified.

The tasks and responsibilities of responsible persons for safety and health at work are also defined. An organisational chart of individuals responsible for safety and health at work was elaborated in organisational units within the ministry and in its constituent bodies – the Police and the Inspectorate for Internal Affairs.

The Police, as an independent body within the Ministry of the Interior of the Republic of Slovenia, provide working means, work equipment and personal protective equipment for the protection of head, arms, legs and whole body for personal and collective protection of employees in case of natural or other disasters. The assets and equipment shall be provided in accordance with the risk assessment, in view of the hazards and harmfulness that may arise at the location of a disaster [4].

## 7. CONCLUSION

Natural and other disasters are among the most frequent threats to the security of the Republic of Slovenia and its citizens. The Resolution on the National Security Strategy of the Republic of Slovenia stipulates that Slovenia should pay greatest attention to activities aimed at reducing the number of disasters and preventing or mitigating their consequences.

The operation of the system of protection against natural and other disasters must be directed towards prevention. All the dangers of causing disasters can not be eliminated, and all those forms of protection and preparedness that enable rapid and effective emergency response must be treated equally.

The attitude of the Police, as a body within the Ministry of the Interior of the Republic of Slovenia, to hazards and disasters, due to the changing relations between nature and the society, and thus the characteristics of natural, technical and technological disasters, must be based on continuous study, understanding and consideration of these interactions.

Adaptation of the system of protection against natural and other disasters to hazards and threats must be continued, as well as ensuring a coordinated response to hazards and disasters.

In this respect, due to the interdisciplinary nature of the activities of protection against natural and other disasters, the mutual cooperation between ministries and other state bodies and local self-government bodies, as well as their willingness and the ability to act independently and respond effectively to hazards and disasters must improve.

This should also be followed by the organisation of protection, rescue and relief forces based on a more coordinated use of the available human and material resources and common infrastructure. Their qualifications and equipment must be improved.

The constant and immediate threat of natural and other disasters requires active participation in international integrations and organisations, and especially with neighbouring countries in the border areas.

The objectives of this cooperation are prevention, mutual support of countries in developing their own systems for managing disasters and crises, mutual assistance in the event of disasters and the implementation of joint international humanitarian and rescue operations.

For the successful implementation of all security tasks in the field of protection against natural and other disasters by the Police, as a body within the Ministry of the Interior of the Republic of Slovenia, it is still important that the Police management constantly incorporates and integrates the area of occupational safety and health of police officers into all plans of activities that are being prepared at state, regional and local levels.

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## CONSTRUCTION OF COLLECTION POINTS FOR EVACUATION IN CASE OF NATURAL DISASTERS

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**Abstract:** *In this paper, we will present the methodology which was originally introduced for Port's and Airport's hinterland presentation. But due to its robustness the methodology is also capable to deal with other issues such as Construction of collection points for evacuation in case of natural disasters. The methodology can take into account many different factors that influence the decision of the collection point location. The methodology will be explained on the Airport's hinterland case and the possible applications for the collection points constructing will be shown.*

**Keywords:** *collection point location, MILP; natural disasters, objective and subjective factors*

### 1. INTRODUCTION

The number of natural disasters is rising and their consequences are increasing yearly. There are six categories of natural disasters: meteorological disasters, fire, environmental pollution disasters, marine disasters, biological disasters and environmental pollution disasters [11]. Natural disasters are the biggest threat to urban and suburban areas. They cause a huge property damage and a high number of fatalities. In many cases, they also affect the economy of the affected region. In many cases emergency situations cannot be avoided; in order to minimize material damage and casualties, it is necessary to provide as much information as possible about safe areas and evacuation routes. Evacuation procedures can prove to be expensive for governments and other agencies. Each natural disaster in the year 2011 caused approximately \$1 billion for damage [9]. Research about disasters and evacuation protocols provide of logistical and methodological challenges. Because of a large number of factors, research of many different fields of science is of interest, such as transportation engineering, risk assessment and management, natural hazards, public health, engineering, sociology, psychology, communication [13]. Exactly planned disaster evacuation strategy is the most important thing for successful evacuations [9]. For logistical planning of evacuation, we decision methods and linear programming can be applied. We propose a method to allow the evacuation points in a certain area determine the optimum hinterland from which the threatened ones should be withdrawn in the event of a natural disaster. In the paper a hybrid model is used, combining Mixed Integer Programming method (MILP) and Analytic Hierarchy Process (AHP) [12]. Only 9 % of article about disaster risk management use mathematical programming for solution methodology [9]. Most commonly used method in literature is MILP model [1, 3, 5, 7, 9, 12]. With MILP authors solve several evacuation problems with integer extension of variables.

## 2. PROBLEM DEFINITION AND METHODOLOGY

The main goal of the paper is to answer the question whether the construction of collection points for evacuation in case of natural disasters can be modelled using the same approach as for solving the port and airport choice problems. The problem focuses on providing evacuation zones in case of natural disasters. The main motive is to find the most suitable route from the emergency origin to the safe point, which can be calculated using the data of population density and distance.

A case is presented addressing a disaster situation in the town of Celje, which is the third largest city in Slovenia. It has 49,377 inhabitants and in history it has been hit several times by various natural disasters, providing a suitable study subject. Figure 1 shows the map of the Celje. Safe points (red crosses) and random spot locations (blue spots) are displayed.

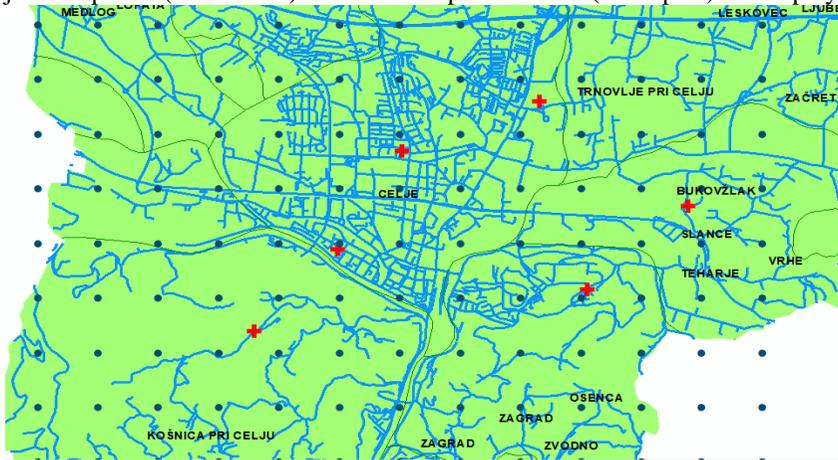


Figure 1: Town of Celje and surrounding area

Source: own

### 2.1 The model

In order to solve the problem stated above, the following sets have to be defined:

1. Point of disaster origin  $D_K$ ;
2. Affected area point  $A_i$ ;
3. Safe point for evacuation  $S_L$ ;

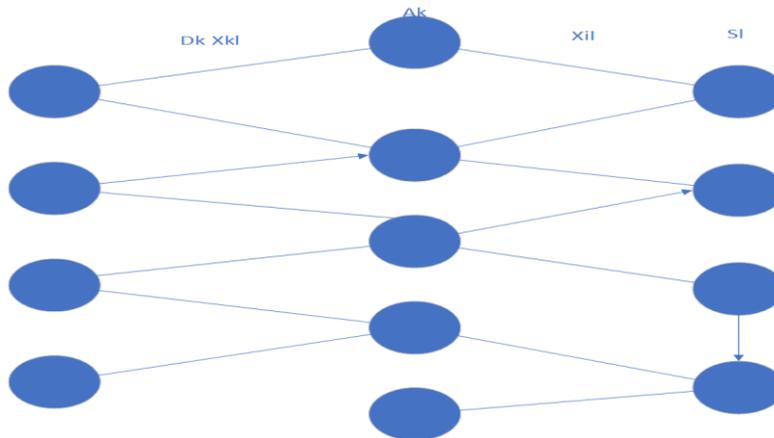
where the set indices denote the number of elements. As the purpose of the problem, the only directions for the affected people is in sequence from  $D_K$  towards  $S_L$ . The model operates on the distance between the defined three points as well as the preference rates of safe point for evacuation:

- $x_{KI}$  – edges between point of disaster  $D_k \in D_K$  and affected area point  $A_i \in A_I$
- $x_{iL}$  – edges between affected area point  $A_i \in A_I$  and safe point of evacuation  $S_l \in S_L$
- $PR_L$  – preferences rates of safe point for evacuation
- $PD_I$  – population density

where:

$$k = 1 \dots K, i = 1 \dots I, l = 1 \dots L$$

The situation is displayed in Figure 1. The main purpose of the paper model is to find the optimal safe point for evacuation  $S_l \in S_L$  for each of the affected area point  $A_i \in A_I$ .



**Figure 2:** Network model

In order to solve the problem, we must follow three stages:

1. Generation of affected area points;
2. Collection points for evacuation calculation;
3. Area of safe points calculation and visualization.

## 2.2 Affected area points generation

The area map analysis was performed using ArcGis software. The map includes the road network and safety zones in the area. With the help of Voronoi cells points across the entire area must be generated, representing the homes of affected people. The distances between the disaster origin and safety zones are used in order to construct the origin-destination distance cost matrix.

## 2.3 Collection points for evacuation calculation

In the second stage we must follow the sub-stages: AHP implementation, definition of weights and safe point selection using MILP. In addition to the distances from affected points to the safe points, each safe point is rated with a preference rate. Preference rate is calculated by using the Analytic Hierarchy Process (AHP). The analytical hierarchy process method is the most commonly used multi-parameter decision method [2]. The main advantage of the method is the consideration of the subjective factors of the decision maker. It is precisely for this reason that in practice it is combined with other methods that take into account objective factors [8].

In the first step of AHP each safe point for evacuation was rated by some experts in the field of security and natural disasters. Each respondent is required to rank the criteria from 1 to 10, where 10 have the highest influence.

The main point of the AHP method is to draw up a matrix that expresses a set of relative values of all possible choices. The matrix is obtained by determining each of the alternatives according to the scale, how important it is for the selected problem in relation to other alternatives [10].

Pair comparisons in the scale (from 1 to 9) are performed for all factors that are taken into account in the problem. It is recommended that these factors are no more than seven, since then the problem becomes very complex. It should be take into account that when a factor, say factor F, is considered to be an absolute factor relative to factor G, then the factor G, with respect to factor F, acquires a value of 1/9 [10].

After completing the matrix pair comparison, the relative weightings of the factors must be calculated - this list of weights is called the own vector [10]. The elements of the matrix must be normalized so that the sum of all the elements in the row or column is 1. The normalized own vector represents the weights of the criteria. For each of the matrices, we can also calculate the harmonization index, through which we can understand how the comparisons are consistent with each other [13]. If the compliance index is much greater than 0.1, the values are not reliable and the study needs to be repeated [10]. In the last step we combine the relative weights of the criteria to obtain composite weights. The weights obtained are estimates of decision alternatives. Final estimates of individual alternatives are obtained by multiplying the estimates of individual criteria by weights and adding them together [13]. After the calculation is done, the result is preferences rate for safe points.

**Table I:** Preference rate for collecting points

Collecting point	Preference rate
1	0,1854
2	0,1545
3	0,1652
4	0,1432
5	0,1254
6	0,1285

In the second step the safe points are compared against each other according to the ranked factors. For the connections between defined points we define:

$$w_{ki} = h \cdot m^2$$

$$w_{il} = \frac{1}{PR_i} \cdot d_{il}$$

Where  $PR_i$  are the preference rates for safe point, respectively.  $H$  is the severity of the natural disasters, which is determined by class of the natural disaster. And  $d_{il}$  is the distance between affected points to safe point for evacuation.

## 2.4 Linear program

In general, people would be forced to choose the safe point for evacuation that can be quickly reached so the linear program is presented in LIINGO is as follows:

- Distance Function  

$$\text{MIN} = @\text{SUM}(\text{LINKS1}(\text{K}, \text{I}): \text{DISTANCE1}(\text{K}, \text{I}) * \text{VOLUME1}(\text{K}, \text{I})) +$$

$$@\text{SUM}(\text{LINKS2}(\text{I}, \text{L}): \text{DISTANCE2}(\text{I}, \text{L}) * \text{VOLUME2}(\text{I}, \text{L}))$$
- Point of natural disaster  

$$@\text{FOR}(\text{DISASTER}(\text{I}): @\text{SUM}(\text{D}(\text{K}): -\text{VOLUME1}(\text{K}, \text{I})) = \text{SUPPLY}(\text{K}));$$
- Affected points  

$$@\text{FOR}(\text{A}(\text{I}): @\text{SUM}(\text{DISASTER}(\text{K}): \text{VOLUME1}(\text{K}, \text{I})) + @\text{SUM}(\text{A}(\text{I}): -$$

$$\text{VOLUME2}(\text{I}, \text{K})) <= \text{FLOW}(\text{J}));$$
- Binariness;  

$$@\text{FOR}(\text{DISASTER}(\text{K}): @\text{SUM}(\text{A}(\text{I}): \text{VOLUME1}(\text{K}, \text{I})) = \text{SB}(\text{J}));$$

$$@\text{FOR}(\text{SUMA\_BIN}: @\text{BIN}(\text{SB}));$$

where the flow from each  $a_i$  to each point of evacuation is smaller or equal to the supply,  $sp$ , of the affected points.

### 3. CONCLUSION

Based on the methodology developed for ports and airports choice, using AHP and MILP methodology, in this paper, we wanted to adapt the model for construction of collection points for evacuation in case of natural disasters. For this we have constructed a simplified graph of the three groups of entities that are involved in the presented problem. Regarding the importance of the factors that influence the evacuation of natural disasters, we defined the weights with equations and provided a linear program that is solvable with the LINGO software environment. For all of the generated points with the help of Voronoi cells in ArcGIS, the program calculated which evacuation area is optimal for each affected area separate. Figure 3 shows the final result of using the model in the Celje area. Since it was intended to demonstrate the use of a model for building a hinterland of evacuation points, we limited ourselves to a smaller area and used only few starting points (the homes of the city's residents). For a more detailed analysis we should increase the number of points and examine the evacuation points more carefully, depending on the type of natural disaster.

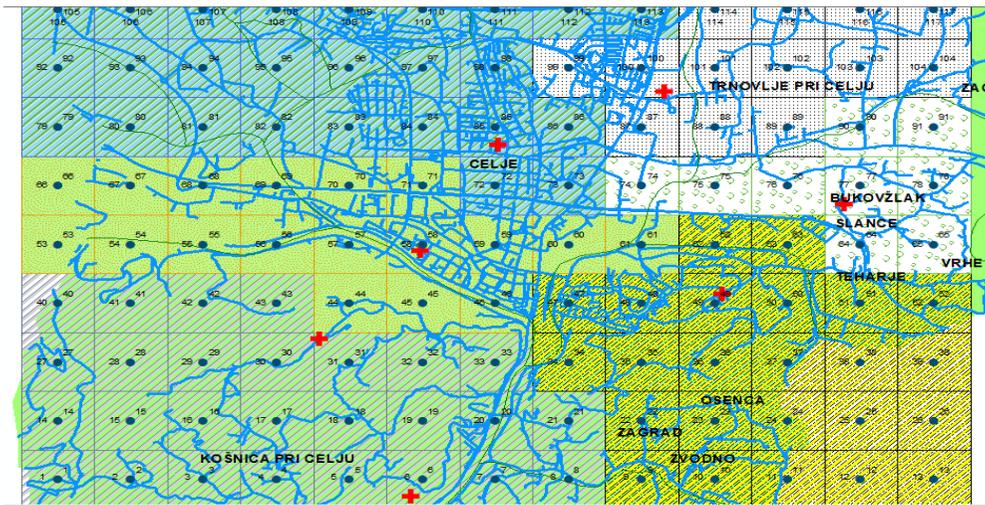


Figure 3: The hinterlands of safe points in Celje  
Source: own source

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## CONCEPT OF EVENT AND EXTRAORDINARY EVENT IN ORGANIZATIONAL SYSTEMS

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***Abstract:** Operation of organizational systems in a dynamic environment implies permanent environmental influences. The tendency of these influences, since these are in connection with the operation of other systems with the aim of meeting their needs, is the creation of entropy of organizational systems. Patterns of influence are found in different phenomena in the environment. Impacts can be made by one phenomenon, two or more. The interaction between phenomena usually contributes to an increase in the influence by intensity, time and number of exposed values.*

*Daily functioning of organizational systems consists of a series of activities in space and time during which different risks and individual decisions create different modalities of system sensitivity. The resulting modalities are conditioned by characteristics of people, organizational system, nature and social phenomena. Significant characteristic of organizational systems, from the aspect of various environmental influences, is sensitivity to these influences. The result of various phenomena is the appearance of events and extraordinary events.*

***Key words:** organizational system, event, extraordinary event*

### 1. INTRODUCTION - PROBLEM DESCRIPTION

The complexity of systems requires permanent investigation of the possibilities of improving the protection of system values. Operating conditions and environment are in constant interaction and present the source of phenomena which make a sort of influence on system values. The approach to solving the issue of appearance of events and extraordinary events depends on conceptual observation of these two phenomena. In the paper is discussed the concept of observing a set of circumstances which cause generation of different events and extraordinary events in system environment. By analyzing the content of the available papers developing this topic, this paper strives to set the basis for the perception of events and extraordinary events from the aspect of the influence on organizational systems values.

### 2. ORGANIZATIONAL SYSTEMS

The need for organization emerged in social community due to new environmental conditions. Namely, by improving their own characteristics, different communities started to achieve better results. That is how different organizations appeared. Considering that inevitably organizations had larger number of elements, which were mutually dependent and operation of which was directed towards common goal, it could be discussed about the origin

of organizational systems. Organizational systems, as complex systems, have and develop the following characteristics [11]:

1. Exchange of information is performed on meaningful (semantic) level;
2. Behavior is based on the system of values, and not only on the goal;
3. Behavior is stochastic, because of the influence of random process on important characteristics of military organization systems;
4. Organizational system is self-organizing, respectively, it develops in the direction of entropy reduction, with the influence of the systems in the environment.

Significant characteristic which can be noted is that organizational systems permanently adjust to the changes in the environment and change their own characteristics and performances, with the goal of responding to the changes. Fluctuation, intensity and variety of changes in modern environment are such that, essentially, organizational systems do not have periods of hibernation, but permanent transformation and adjustments.

### **2.1. Situational approach to the study of organizational systems**

Connections and relations inside organizational systems are variable and developmental categories. In order to achieve sustainable system and relative stability, and to adequately respond to the influence and challenges from the environment, the system has to adapt to changes. The ability of organizational systems to provide conditions for their own successful operation, maintenance and development through certain changes in internal structure and organization is familiar as dynamism. The condition for the existence of organizational systems in changeable environment is the development. Development is the road which organizational system follows in its own existence. Organizational system must base its development on the quality system, in order to provide permanent improvements, targeted towards the realization of the set goals [1 2] .

Stochastic elements, specific for functioning of organizational systems, are characterized with changeable nature of the environment in which these operate. Turbulence of the environment also depends on the kind of the system observed, whether it deals with products or services. In the product systems, the variability of situations is much higher, compared to the service systems. The importance of the situation, respectively, the set of circumstances, in a given moment is crucial for the management of organizational systems. Namely, organizational systems are not ideally arranged organizations which do not receive significant influence from the environment, but depend on the situation; not every model of organization is equally successful, but its performance depends on the situation. Such approach puts in the first plan situational approach to the observation of organization and highlights dependence from each individual situation [1 3]. The situation presents a set of internal and external factors (set of circumstances) in a given moment. Considering high degree of uncertainty in contemporary business and use of organizational systems, situational approach insists on permanent monitoring of changes in the environment.

### **2.2. Quality of organizational systems**

Providing uniform system functioning in all situations is possible only using quality system. Quality of organizational systems implies complex characteristics required by the users (performances, usability, availability, reliability, maintainability) and broader social community (goal realization, social responsibility, protection of environment, *etc.*), but simultaneously are required quality relationship with customers, flexibility of process, quality service, quality life, ethics, consciousness and culture of quality. Quality as dynamic category depends on the relationship inside organizational system and relationship with environment, and presents totality of inherent characteristic which are the result of behavior of system during its existence [2] .

Complexity of organizational system is determined by interactions of deterministic and stochastic character. Existence of the elements of stochastic characters leads to appearance of phenomena and events, to which the subjects of organizational system must have certain influence, in order to keep them within the planned limits [1]. System arrangement of military organizational systems allows identification of stochastic phenomena and events and undertaking efficient measures for the implementation of control over them. System quality should guarantee that the system will react in the uniform way every time.

## **2.2. Exposure and vulnerability of organizational systems**

A set of phenomena in the environment implies the influence on the values of organizational system. The influence can have positive or negative effects. Considering the elements of the environment, organizational system can be in the state of exposure and the state of vulnerability.

**Exposure** of the values of organizational system to the influence of the event from the environment presents very important characteristic of the opportunity of hazard appearance. Exposure is the degree to which an organization and/or interested party is subjective to the influence of certain events. Exposure refers to the number of people and/or others elements of the system (values) under the risk which can be affected by certain event. Together with vulnerability and hazard, exposure is one more precondition of the risk and negative impact of the events to the values of organizational systems [3].

Next to exposure, important precondition for the occurrence of a negative event is vulnerability. **Vulnerability** is dynamic, inherent characteristic of every system (households, regions, countries, infrastructures or another risk element), which contains many components. Its scope of importance is determined by the seriousness of the event. Vulnerability indicates the potential of damage and presents a forward-looking variable. Vulnerability should include anticipative characteristics, imagining what could happen to a certain system in conditions of certain risk and hazard. Determining vulnerability means to question what will happen, if certain event (events) affects certain elements which are under the risk [5]. Vulnerability is inherent property of the system which is always present even in peaceful period between the events. It is not activated or excluded as an event appears or disappears, but it is constant and dynamic property which in the event is manifested to certain extent, depending on the strength of harmful events. That means that vulnerability can often be measured only indirectly, and for such indirect measurement the criterion to be considered is the resulting damage.

## **2.3. Resistance of organizational systems**

Resistance presents the ability of an organization to absorb the consequences of interrupted business, and to keep the level of services at minimal achievable level [11]. This is the ability of a system, community or society exposed to hazards to adjust with resistance and change, in order to achieve acceptable level of functionality. This is determined with the possibility of the system to organize itself and enlarge the ability of learning from past events, as well as to improve the measures of risk reduction. The ability or capacity of an organization presents the possibility to maintain basic functions during and after the events with consequences to the protected values in the shortest time and with the least harmful effects. Newer literature provides the following explanations [7]:

1. Resistance refers to the measure of the ability of organizations to absorb negative effects from the environment, or to adapt and recover from the events with the consequences on the protected values;
2. Resistance includes strategies and measures taken to alleviate or suppress harmful effects, and the measures of adjustments in order to avoid harmful effects. In that way,

resistance implies the ability of organizations to keep their functionality during the events and to recover from them.

3. Resistance is the characteristic of organizations that is inverse to vulnerability.

Resistance of organizational system indicates the degree of its arrangement, in organizational and management terms. Competence of the management to identify negative events and react timely and correctly is the most important content of the resistance of organizational systems. Such managers develop organizational systems with all the functions formed and which allows the response to the changes in the environment.

### **3. EVENT AND EXTRAORDINARY EVENT**

Continuous changes and development inside and outside organizational systems create the need for flexibility, abilities of continuous adjustments to changing situations, behavior and actions, with the aim of creation of dynamic balance. In conditions of high dynamics and complexity of organizational systems, flexibility becomes important factor for the development and sustainability of systems [1 4]. Different phenomena from environment, manifesting through different events with positive and negative characters, influence organizational systems.

#### **3.1. Concept and characteristics of event**

The environment of organizational systems represents the set of different phenomena and interactions between them. Individual or cumulative action of phenomena or set of phenomena is determined as an event. In literature there are different interpretations of the concept of event which have certain common characteristics (Table 1).

In Pravni leksikon, an *event* represents circumstance which occurs without the will of subjects of organizations, and to which is objectively related occurrence, cessation or change of conditions. An event se often qualified as force majeure. The flow of time is an event of high importance for the acquisition and losing of subjective rights.

According to Mala enciklopedija, an *event* is also every subset of the set of all possible outcomes of some experiment. According to Larousse encyclopedia, an *event* ( *lat. evenire* ) means to happen, to occur. 1. What happens, what comes up or seems, a fact, a circumstance. 2. Significant, striking act. 3. In statistics, it is a coincidence which realizes at specific place; a set of significant facts which happened.

According to the international standard ISO Guide 73: 2009 Risk Management, an *event* represents appearance of a certain set of circumstances. An event is occurrence or change of a certain set of circumstances [1 8]. The same standard in explanation offers next interpretations:

1. An event can consist of one or more phenomena and can have several causes;
2. An event can consists of something that did not happen;
3. An event sometimes can relate to "incident" or "accident" and
4. An event without consequences also can be considered as an event which has been "barely escaped", "about to happen ", respectively, "almost happened".

Analyzing the content of the existing literature dealing with the concept of events, the most significant conclusions can be pointed out (Table 1). [1 2]

**Table 1.** The most important characteristics of different interpretations of the concepts of event

Source	The most frequent elements of the concept of event	Common characteristics
Pravni leksikon	Circumstance which appears without the will of subjects. Force majeure.	<ul style="list-style-type: none"> <li>- Accidental occurrence</li> <li>- Known or unknown cause</li> <li>- Certain circumstances appear</li> <li>- Unidentified in space and time</li> <li>- Without the influence of the subject</li> </ul>
Mala enciklopedija Prosveta	Subset of a set of possible outcomes of some experiment.	
New Larousse encyclopedia	Coincidence which realizes. A fact, a circumstance.	
ISO Guide 73: 2009 Risk Management	Appearance of certain circumstances.	
Standard SRPS A.L2.003: 2010	Appearance or change of certain set of circumstances.	

Having in mind mentioned characteristics, an event can be defined as every random result of a set of circumstances, emerging in certain place and time, without the will of subjects, to whom directly or indirectly influences.

### 3.2. Concept and characteristics of extraordinary event

The importance of events, from the aspect of the impact on the operation of organizational systems, is related to the appearance of hazards to system values. Every disorder in organizational system functioning begins with hazard - familiar or unfamiliar. The term "hazard" originates from the French word "*hasard*" and Arabic word "*az-zahr*", meaning "chance" or "opportunity" [4]. Hazard is defined as "potentially harmful physical event, phenomenon or human activity which can cause loss of life or injury, damage of property, social and economic disorders or degradation in environment. Such event has probability of occurrence in specific time and place, with certain intensity" [19]. The events connected to hazards, direct or indirect, are possible extraordinary events. Hazard is a threatening event or possibility that it happens in certain time at specific place. It implies potential threat to people, as well as the real event which happens to them. Important property of hazard is the impression about probability or possibility of its happening. Hazard is a threat, not the event itself. Every hazard can be manifested through the real harmful event. In others words, if hazard can be measured with the units of real damage, then hazard is not hazard anymore, but becomes the event, accident or disaster. It can be concluded that the events are everyday occurrence which represent a set of circumstances and interactions in real world (Table 2) [12]. Events, as states, have neutral dimension in terms of values from the aspect of hazard to systems, to the moment of their identification or materialization.

**Table 2.** The most important characteristics of different interpretations of the concept of extraordinary event

Source	The most frequent elements of the concept of event	Common characteristics
Alexander C.	Out of usual order, which is not regular	<ul style="list-style-type: none"> <li>- It is not regular</li> <li>- It deviates from the application of the existing legal norms</li> <li>- Use of specially developed norms</li> <li>- Endangers values</li> <li>- Undefined in time and space</li> <li>- Need for extraordinary forces to react</li> <li>- Potentially hazardous</li> </ul>
Rječnik hrvatskoga ili srpskoga jezika	Because of the appearance of extraordinary circumstances it deviates from the application of legal norms, but other are applied, according to the situation.	
Mladen D.	Possibilities of regular power overcome the needs of endangered system	

All the events which imply hazard to the values of organizational systems conditionally represent extraordinary events. Certain event can have legal form of extraordinary event if it is verified in legally defined way by competent authority. The event being "extraordinary" refers to unplanned phenomenon, unexpected action, respectively, deviation from the regular [13].

### 3.3. Implications of events and extraordinary events to organizational systems

Extraordinary event and event be considered from two aspects, such as: 1) legal state and 2) factual state. Formal - legal proclamation of extraordinary event is performed by the responsible authority, in compliance with the procedures defined by law. In factual terms, an event can have all characteristics of extraordinary event, and not be characterized as extraordinary event and vice versa, factual state can be changed and extraordinary event proclaimed, though objectively there are no enough reasons, and vice versa. With certain criteria it is possible to identify state of danger, respectively, its indicators (Table 3) [13].

**Table 3.** Criteria of appearance of extraordinary events from the aspect of hazard existence (adapted according to *Perfilbev*, 1991 in Mladen, 2015)

No.	Criterion	Qualitative description of criteria
1.	Time	External unexpectedness, sudden appearance, conditional expectation, uncertainty, lack of information. Fast-developing events.
2.	Social	Potential human victims, epidemics, heavy injuries, light injuries, stressful situations (fear, depression, panic, <i>etc.</i> ), conflicts.
3.	Environmental	Significant influence on the ecology because of organizational system acting.
4.	Psychological	Destabilization of psychological balance, distortion of motivation of the organizational system members.
5.	Political	Increase of political tensions in the country, serious internal political conflicts, and political uncertainty. Increase of

		international tension, high foreign policy pressures.
6.	Economical	Significant economic damage in terms of money. Failure of engineering system and objects. Need for significant material funds for recovery and damage compensation. Need for larger funds and equipment for prediction of the situation and elimination of its consequences.
7.	Organizational/ management	Uncertainty of the situation, difficulties in forecasting the flow of the event and decision making, difficult reactions on the situation. Need for various experts, services and organizations. Misunderstanding of the decisions of higher instance, ignorance of own possibilities.
8.	Specific / Multiplicative	Numerous and different consequences and their interaction (e.g.: reduced ability to react, no motivation, delays in the development of system elements, inferiority in informatics.
9.	Security	Uncertainty of the organizational system members, increased crime, decline of reputation, system abandonment.

As concrete implications of hazards following extraordinary events to organizational system of all types, appear certain effects which in the moment of appearance or later can have harmful consequences to the values of organizational systems. Due to the existence of such effects occurs death or life and health-threatening injuries of people, which significantly diminish operating ability of people, and the operation of the system in the same time, leading to partial or complete destruction or reduction of the capacity of material goods and to environmental damage, and finally, to disturbances in the realization of organizational goals. According to the acting mechanism, hazardous and harmful effects and can have *primary, secondary* and *combined character* ("*domino effect*") [ 20]. The same measure of impact can provoke consequences of different weight at different people, respectively, the effect of the impact has individual and potential character.

### 3. CONCLUSION

The objective of the management of events and extraordinary events is the optimization of the influence of phenomena in environment to the organizational system values. Prevention of extraordinary events has strategic characteristics, where risk management policy is necessary, preparation of the operative plan of risk treatment and implementation in technological and operating processes of organizational systems. In the preparation of the risk treatment plan, organizational systems should provide operationalization of all parameters of the confrontation with potential critical points. Promotion of definitions of the concepts of event and extraordinary event should enable the management to develop the abilities for identification and undertaking measures for reaction in accordance to the circumstances. Organizational systems are especially suitable environment for the development of circumstances in which is possible hazard appearance. A number of elements and phenomena in process interactions potentially results in large number of combinations of phenomena in the environment. Current investigations are directed towards the development of indicators according to which responsible authorities could simply and efficiently predict the occurrence of circumstances with negative impact to the values of organizational systems. Complexity of phenomena and systems themselves does not allow simple defining of indicators, thus empirical knowledge is more used as support.

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## EXAMINING LEADERSHIP AND LEADER PERFORMANCE IN EXTREME CONTEXTS: PSYCHOLOGICAL IMPLICATIONS

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**Abstract:** *Performance, as abstract and multi-dimensional construct, divided in military and civilian professions' main groups, has its measurement challenges, mostly expressed in high dynamic contexts. Leadership and its effectiveness largely depend upon the context. Compared with conventional environments, in extreme or dangerous military or other high-risk operational contexts, leadership is critical, mostly in some of event phases. It is one of the last, less explored leadership area, that is "under-researched" and where researches are essential, specific, even highly difficult to conduct, mostly in case of systematical approach. Operational psychology' gives main contribution, given its specific approach capacity and its core role of psychological researches in operational settings, followed by other activities for enhancing high-reliability personal operational performance.*

*This work main aim is an attempt of understanding leadership and leaders' performance in dangerous contexts, distracting specifics, similar terms and measurement challenges, and detecting psychological contents relevant for the operational psychologist' activities of operational performance enhancement.*

**Key words:** *leadership, extreme context, performance, operational psychology, high-reliability personnel*

### 1. INTRODUCTION

Operational professions in the military or in other segments of the national security system (NSS) are characterized with uncertainty, unpredictable, dynamic and risk context. This indicates high-demanding personnel, nonexistent or poor procedures, guidance or other kind of legal framework, academic and other literature, and on the other hand specifics, limitations and difficulties in research procedures vs. the great need of all that in practice. This is especially expressed in high-reliability professions, as special operation personnel, undercover agents, military pilots, astronauts, drug prevention team, bomb removal experts, or SWAT teams [26], in which difficulties are sublimated; or when comes to their leaders. One of the most important and critic for the NS goals are variables as leadership and leader performance, given the complexity of the terms vs. evaluation needs. Understanding the concepts, differences and relationships of this variables, and then distinction of the extreme than other contexts, is very important for their enhancement during training, for which detecting and understanding other related psychological factors, is crucial [7].

The literature can't recognize consensus in scientists about defining the term of **leadership**, given its complex nature. Definition depends on the theory approach, but according to some authors there are as many theories as authors or researches. Also, the literature is fulfilled with many unclear theories and contradictory research results (Druckman, et al., 1997). Certain scholars believe that we still have not come much closer to defining what leadership really is (Grint, 1997), even it is mostly related with the terms of influences, relationships and processes. Shortly, leadership is related with the process of influence of one person as a

leader to minimum another one person as a follower, which explains their relationship, what Day (2000) defines it as *leading*, or process of individual influence to others. The wider definition includes the ways of explanation of leadership referring to its key concepts, as leader personality or dispositions, behavior, effectiveness, process of interaction with the followers or importance of the context [6]. Similarly is the *complex adaptive leadership*, which “influence the emergent social dynamics ... to achieve adaptive responses to challenges”, requiring the high-quality network exchange [15]. Bass & Bass (2008) argue that “the definition should depend on the purposes to be served”, defining it as “ability to influence, motivate and enable others to contribute to the effectiveness and success to the organizations in which they are members”. In general, there are some of the research attempts chronologically in the last two centuries that are trying to determine what generates the leader or how they stand out from the mass, even its true nature is still not discovered, neither its relationship with some criteria variables (like followers performance) is clear (Badshah, 2012). Most often are mentioned autocratic, democratic and ‘laissez-faire’ leadership styles or function, which the first two are equated with task-oriented vs. people-oriented, directive vs. participative, initiating of structure vs. consideration, transactional vs. transformational style in other authors. Styles’ efficacy is not unified - it depends of many factors, as the context, leader and followers’ personalities, group’ characteristics, task, style used by leader’ superior, and sth. Combination is recommended; one is dominant, while other is used as additional for better results, especially important for the NS organizations. Leadership researches can use qualitative or quantitative methods, and can be evaluated by superior, subordinates or self-evaluations.

Definitions about *performance* differ in disciplines and authors. The shortest defines it as behavior and actions oriented to organization’ goals. Performance is perceived as a complex, multi-dimensional, dynamic and abstract construct. Abstract or latent construct means that it cannot be pointed to or measured directly, but through its manifestations or indicators. A latent structure was found, consisted by multiple components that are multi-dimensional, consisting by their indicators. There is difference between *behavioral* or process aspect, meaning actions (that can be assessed), and *outcomes* or results of that actions. They are related but there is no complete overlap, given they are affected by different determinants [28]. Also, there is no clear cut in authors; some authors insist on clear demarcation (as Campbell, 1990), while others (as Bernardin, 1980, 1984) deemphasize that difference. One statement is that in the construct can be included only those aspects over which individual has control, while others see that it is a matter of degree [30]. There is *individual* and *group* or *team performance*; *task*, *contextual* and *adaptive performance* and *counterproductive behavior*; *leader* and *followers’ performance*; *effective* and *ineffective performance*, .. Performance assessment can rely on *objective measures* or on *subjective judgments* (of quantity and quality of work) by the supervisors (subordinates or professional evaluators). Sometimes colleagues and self-evaluations are used, while most effective were found group meeting of evaluators after their individual evaluations. High correlations were found between colleagues and subordinate evaluations, while higher between different professional evaluators vs. between different colleagues’ evaluations [31]. Most important for performance evaluation is the construction of a reliable and valid criteria and measurement, which helps in its predictors detecting and can be personal or contextual. In case of criteria, literature was found fragmented and incomplete, while in case of measurement and publishing in the NSS, secrecy is one of the additional limitations. So, dimension may generalize across the jobs, while indicators can differ from job to job [22]. Job can be organized in different categories or families, while the most general division is on civilian and military jobs. There is no clear consensus on what exactly constitutes the work performance. While different authors talk about existing of two to eight factors, Viswervaren (1993) provided three-level hierarchical model with one general factor at the highest level as

the better fit to data than a two-level model. *Dynamic* criteria mean performance and differences are not stable over time, so making criteria is more difficult as the job is more dynamic or complex [7].

The terms of performance and leadership need to be distinguished from *effectiveness*, or other similar terms, as productivity, efficacy or successfulness, that is mostly important in case of their assessment, measurement or making criteria instrument or other measures for evaluation, research or other purposes. Those are terms in the literature with an unclear meaning, given that they usually refer to the same, while some authors distinguish them. Effectiveness refers on the evaluations of the results of the performance, while *productivity* is a ratio of the input and output. Hannah, et al. (2008) differentiate *leadership efficacy* from *leader efficacy*, explaining a multi-level model in which leader efficacy and follower efficacy dyadic interplay have influence through the group interaction and build over time the collective efficacy, that impact on the collective performance by promoting a group believes. Some authors differentiate *leadership in public vs. private institutions*, mostly given the differences in organization [19]; different function that sectors have in the society (in public sector monitoring and facilitating role in leader was found more emphasized, while the relationship between the leader' goal oriented role and effectiveness is weaker [1]; differences in the work context that impose different leadership style, that explains why public managers more use participative vs. directive style in private sector [18]; the transformational was found as quite more important than transactional evaluated by different levels of leaders in the US federal government [29]; transformational was confirmed as more effective than transactional and passive-avoidant style in the normal contexts (Bas & Bas, 2008). Even though the police' organization model is adopted from the military, that encourages many critics and attempts aimed to distant the two organizations. Except similarities, there are also some differences. The two work methods in the police come together in case of crises and incidents, even there are not used continuously as in the military [5], confirming SWAT teams as closest to military organization, operational methods and leadership [7].

## **2. LEADERSHIP IN EXTREME CONTEXTS: THEORETICAL APPROACHES AND METHODOLOGICAL CHALLENGES**

Leadership in extreme context (EC) is one of the least studied areas in the leadership, even though it is where is needed the most. Leaders in extreme contexts were shown highly sensitive of the context; while unfortunately for a long time in researches about human behavior in organizations the context where it happens wasn't taken into account. Context-oriented or situational models explain leadership and its effectiveness as context dependent, even that impact is an under-research area. As context changes leadership changes, as well. It is not recommended adapting leader' style to the situation, but more effective was found leaders that are put in situations which demand their preferred style. Leadership in EC is uniquely contextualized. Some specialized theoretical approaches will be summarized.

Hannah, et al. (2009) accent that "unique factors influence leadership in EC", distinguishing EC from crises or other contexts, extreme event or organizations that operate in EC (ECO) in the commonplace (as military, medical, law enforcement, or fire and crisis response organizations). *Extreme context* is defined as "environment where extreme events are occurring that may exceed the organizational capacity to result in intolerable psycho-physical consequences to organizational member", addressing the *extreme event* as an episode, which may also come in form of a crises, even crises can be as. *Crisis* is more general term, while ECs are unique and need stricter characterization; crisis can lead to EC or vice versa. EC goals are not just high priority as in crisis, but they are imperative, on which point unique properties lead the leadership that are not present at lowest levels of threat. While crisis implies a reactive responses in short time, ECO can foresight or even

control the initiation of an extreme event, even EC are broader defined than high-reliability organizations that can go in and out of EC. So, *demands of leadership* differ in different phases of the event (location in time, potential magnitude of consequences, probability event may occur, proximity or closeness and form of threat), emphasizing adaptive leadership response capacity as a priority. Finally, any theory for leadership can't be generalized for all ECs and organizations. *Critical action organization* (CAO, implying military combat units, certain clandestine services, SWAT, fire or other rescue response team) have a greater potential for the consequences for numerous members than other types of ECO (as trauma, high-reliability and naïve organizations); the directly faced ECs units and personnel in CAO require more extensive training and all members of the team need to be prepared to take the role of a leader in case the leader is lost (especially military special forces and SWAT). More specifically, selected CAO, as military and clandestine units may at time actively create extreme events to accomplish their goals, given they operate in hostile environments where consequences to the "enemy" is purposeful vs. "do not harm" and "safety first" principles as priorities in other types of ECO or CAO, which will not actively injure the target unless in self defense. Especially unique is the leadership in case of clandestine operations. [16]

Campbell, et al. (2010) mention *dangerous environments*, as "those in which leaders and followers are personally faced with highly dynamic and unpredictable situations and where outcomes may result in severe injuries (or death) to unit member", encountered in war and other military operations, law enforcement, firefighting or sometimes in intense training operations, excluding EC where the threat is outside the unit or group, to emphasize the differences in examination. Ambiguity, uncertainty and unexpectedness in events that dangerous contexts (DC) are filled, as typical cause of potentially lethal errors, are identified by Baran & Scott (2010) as a key of differentiating DC from conventional. They promote different orientation as required in order to understand leadership in DC compared with the conventional contexts. In their *sensemaking analysis of leadership in DC*, it is explained "as a collective sensemaking process, that serves for reducing environment's inherent ambiguity while simultaneously promotion of resistance in the face of danger", meaning that leadership results from ongoing *reciprocal interactions* among the team in the situation regardless the formal ranks, which serve for clarifying the meaning of the dangerous event for all involved. [3] This reminds on the "lens role" of the combat leader in Gal & Jones (1995) model. Later is empirically tested [11, 27]. Kolditz & Brazil (2005) define *in extremis leadership* (IE) "as giving purpose, motivation and direction to people in eminent physical danger, where they believe that leader behavior will influence their physical well-being or survival", putting the difference in its increased complexity, interdependence and ambiguity. "At the point of death" put accent on the circumstances, where outcomes mean more than success or failure of the task performance, involving life or death [21]. The last question as the biggest difference of other kind of organizations sets apart Sjoberg et al. (2006), explaining *leadership in stressful complex rescue operations* as a causal process of a three categories, as pre-operation everyday working condition impact on leadership during the operation, which affect post-operation everyday working conditions. *Multidisciplinary approach* of Fisher et al. (2010) explains the nature of leadership in IE context in conception, putting *trust* as essential for the fighting power, which developed over time and through testing, reinforces the relationship of mateship (close personal relationships) and "bright" competences (found 10, firstly courage), on which trust is mostly based. While mateship and training have a dual role, they build and explain the competences also serving as a buffer toward stress and other "shadow" influences (corruption and violence). [13] Others found crucial the influence of prior performance success in DC, self-efficacy and ethical behavior, for leadership in DC [3]. The *role or demands of leadership* change in *pre-during-prost extreme event phase*, while it was found crucial in moments of transition. Given the immediate and dangerous threat, autocratic and directive leadership with fast decisions is necessity and correlated with the

effectiveness during *in situ phase* (Bass, 2008). Also, becoming closer to the followers, as situation gets more extreme, using authentic leadership [2] emphasizes *self-awareness*. Research in firefighting captains confirm this, finding active leadership style leading to high performance vs. passive leadership, in both EC and normal contexts; in EC (emergency scene) transactional (more directive) style was found as more effective vs. transformational (relationship building) in normal context (routine day in the station); engagement in transformational style during normal contexts lead to increased leadership effectiveness in EC, due to build higher level of relationships and trust [14, 20]. Trust as the base of the *in situ* effectiveness, is allowed only if it is built by the leadership actions before the event. In the phase of creating “cognitive shifts”, leader needs a “*possibilistic thinking*” to prepare the group for the threats. To rebuild trust and personal safety, an open, transparent, supportive, empathetic and individually considerate leadership approach is more than necessary in “*psychic reorganization*” process after the extreme event. Given demands of the changing conditions, *ability to adjust* their leadership between more administrative to adaptive forms across time is important in EC leaders, despite finding the right mix may be problematic, and for which effectiveness’ disentanglement further researches are suggested. Different forms of leadership are required on different levels of leadership, considering the adaptability of organization required between more direct on *tactical* to more administrative control on the *strategic* level [16].

Actually, little is known about how IE leaders operate and what constitutes effective IE leadership. Researches during high-risk operations have *methodological challenges*, they can be dangerous and physically demanding, and usually are difficult or “nearly impossible”. Otherwise, theoretical models are often criticized about lack of validity; the retrospective study can be problematic, given the time factor and emotions; while the case study, as commonly used, has difficulties in replicating. Simulations or field training is one most close option, with own limitations. In case some researcher has a possibility to be present during operation (or training) in some operational role or just to observe or specifically to conduct research, except other conditions (like at least basic operational knowledge), researcher’s appropriate methodological preparedness is needless to be mention (in order to be able to talk about any scientific research or scientific conclusion). Mixing qualitative and quantitative methods increase the validity, methods sometimes supplements each other, given detected lack of concerns in leadership researches about influences of contextual aspects. Yammarino et al. (2005) identify four important level of analysis: individual, dyad, group and collective or contextual, which inter-level differences are not taken into account. Hannah et al. (2010) sent “call to arms” for rigorous empirical researchers on this topic in DC that will be able to capture these dynamic multilevel processes, which lack they previously identified. [7] Given that combat findings may differ from those developed elsewhere, Kolditz (2006) emphasizes the usefulness of distinction between *task* and *social cohesion* in combat, which work’ critics as “unscientific” opened a broader issue about external and internal validity of non-combat or peaceful settings to the social scientists. Absence of “mortality salience” excludes generalizations of findings in combat settings, even researches done in military organizations or with deployed units. [21]

### **2.1. Leadership performance in extreme contexts: some important notes**

Military is high-reliability organization which had capable recourses and mostly invests in developing approaches to measuring job performance. In case of performance in EC important is distinguishing of operational, leadership and training performance from organizational during the normal day. Given the limited possibilities for those researches during extreme event, the found high correlation between field and training performance is important in these professions. Evaluators need to be well trained in variables distinction, mostly between leaders’ capabilities or leader behavior vs. leaders’ performance measures,

and to be aware about existence and eventual need of recognizing mediating variables and relations that are less observable. The last is especially important in case of maintaining a model or making the performance measure by the psychologist, or if some evaluations need to be done by non-psychologist personnel in the unit, about what operational psychologist (OP) is responsible to instruct them. Making a valid criterion in IEC is additionally complex. Besides many researches about measuring performance, as a part of criterion-related validity in the military settings, there are few about IE leaders, even the first noted are the base. Campbell (1990) developed a framework for army consisting of five factors, while Griffin et al. (2007) found three factors about performance in DC: competences, adaptive and proactive. Mumford et al. (2000) multi-faced model that describes problem solving skills, social judgment skills and knowledge as a mediators between leaders capabilities and leader problem solving and performance, was partially supported in the study of [4]. In order to explain the framework for heroism, Wansink, et al., (2008) listed criteria for awarding medals for heroism in DC (*rescue, extra aggressiveness, grenade situations, rear defense, refusing medical aid, and showing leadership under extremely difficult circumstances*, Gal, 1981, Blake, 1976), noting that listed situational circumstances provide an extra context, from which leadership characteristics (as *self-discipline, resourcefulness* and *high self-worth*) produce heroic behavior. The last can be taken as an indicator for successful leadership performance in the hazardous professions. So, on these leadership characteristics and heroic behavior, bravery medal awarded IIWW veterans rated themselves higher than not-awarded, although all displayed forms of courage during the combat. [32]

## 2.2. Psychological processes during IE leadership and psychological implications

Leader with their interpretations and competences [12] is central figure in field processes, where interplay of many psychological factors (predictors, mediators, moderators and outcomes) create and lead series of situations, which relationships are unique, little known or empirically confirmed and differ from the normal contexts. Gal & Jones (1995) explain leader' "*lens*" role as *mediating variables*, through which a number of *antecedent variables* (as individual, unit and battlefield factors) affect the soldiers' individual appraisal of the combat situation, and result in *modes of response* (involuntary: physical, emotional, cognitive and social) and *modes of coping* (voluntary: activity or ineffective performance and fatigue). **Soldier' appraisal process** is unconscious (*judgments, discriminations and choice of activity*), a bridge between external conditions and soldiers' response. Oriented to combat background, **leader** makes his individual **appraisal** through dynamic cognitive processes of *interpretations of antecedents, expectations of consequences* and *presentation*. [8]

Contextual approach found leadership in DE and its effectiveness depending on individual and contextual or situational characteristics. In order to explain EC, other group of studies is focused to **environmental demands**, which some authors put equal with the term of stressors, while individual characteristics are implied in cognitive and action-oriented handling with those demands. Environmental factors are not automatically extreme in nature. *Stress* differs than *stressors* in order to define context as extreme, given the subjective vs. most people appraisals of objective environmental factors or situation existence. This still based on different experiences, given situation also has *ethical dimensions* or *moral demands* that have impact on the cognitive processes of personal appraisal, while are usually overlooked [24]. Performance related stress in normal individuals on the field [7], differ of illness or PTSD as a consequence that need to be treated in the post-event phase [8]. The *leader appraisal* of the balance between what is stake, human lives and manageability of the situation is a central perspective of Sjoberg et al. (2006) definition of leadership in rescue operation. Organizational climate before the incident vs. positive stress reaction and the personal knowledge of the co-actors were found as most important factors explaining favorable outcome in those operations; while when leaders appraised that situation can't be resolved

with the available resources were rated less favorable no matter if humans were perceived as being threatened or not [27]. Sometimes demands also influence or interfere with *decision making processes*. Sjoberg et al. (2006) detect a lack of integration of leadership and decision making model during new, complex rescue operations. It's not just a context that qualifies the situation as IE, but also the perception of the context by the involved individuals is important, that depends on their levels of expertise and training. In the model *situational awareness*, as an intermediate state in decision-making of dynamic system, with *distributive cognitive capacity* and *presentation capacity*, are factors of two "sequential and reciprocal" process of how leaders make sense in IE and how convey that socially constructed sense in IE to subordinates. The way of understanding and making meaning of own experience in a priority depend on who person think he is in a context. [11] Lack of researches about environmental demands is mostly detected in leader situations on higher organizational levels, especially on topics involving *moral dilemmas* [24]. Larson et al. (2005) explain Yammarino (1994) *indirect leadership model* of two principles (cascade model-leadership is mediated through subordinate managers, and by-pass model – high-level managers make direct contact with the employee several level below) in the military context by two simultaneous processes: *action oriented*-use link for passing the message to the lower levels, and *image-oriented* - being a role model; both filtered through a "lens" that determine weak or strong safety culture or developing trust in higher leaders in favorable case [23].

**An operational personnel training** is one of the basic operational psychologists' (OP) roles. Adaptive coping [7], as the central target for enhancing performance in mental readiness trainings, is strongly determinate by the combat situation; also gives input in the reappraisal (optimistic or pessimistic). Cognitive-behavioral psychological techniques are the base for the demanding, rottenly used training programs (SIT, SET, SERE, Thinking dispositions and Mindfulness concepts), for which OP is specially certified [8, 10]. Even leader development processes in DC do not crucially differ than non-DC, the content of training, education and development must be directly relevant to the DC and found target capacities - both need to be understood for effective process. Expectations for development need to be clear communicated for prevention of rigidity or leader ineffectiveness in some of EC phases. Among others, multifaceted and complex identity is a priority target in tactical-level leaders, allowing them to adapt in fulfilling the multiple roles, as: intelligence manager, tactical war fighter and commander, diplomat and negotiator, nation builder and troop and unit leader. Of course, self-complexity needs to refer on identity aspects that are relevant to DC. Collective leadership mechanism for meeting leaders' development is necessary, on which types next researches is suggested to be oriented [25]. **Psychological screening** for IE leaders' selection is crucial, based on found psychological predictors for their performance. The **debriefing counseling** is important for reappraisal process and stress management. OP in a priority is oriented to **conducting researches** for development of psychological instruments and assessment procedures for leaders' selection that implies development of valid instruments for performance measurement; as well as on evaluation procedure of leadership behavior and leader' performance [7]. **Consultations** on relevant psychological issues about relevant sides for organization and during operation ("looking operational world through the psychologist eyes) increase team and IE leaders' performance, mostly in aspects of decision making [10]. For achieving this, understanding specifics of IE leadership, IE leader and followers' duties, relationships and ethical codes, as well specified operation or NS context, in OP is crucial.

### 3. CONCLUSION

There are some specific groups of researches about leadership and performance in high-reliability organizations, but this paper is primarily oriented on introductory theoretical preview about IE leadership, clearing the differences in some related terms and detecting some relevant variables. Despite unclear literature about leadership nature, what is leadership

in EC still remains enigma. While most of the literature is theoretical, only some of the studies imply empirical evidences and methodological sustainability. Empirical data is most missing about the psychological processes of the “happening” of the leadership process and the interplay in situ, which is only briefly indicated in paper. The contextual approaches were long time excluded. An attempt to separation of combat vs. social sciences approaches is noticed. Leadership in IE must be examined in particular type of IE context. Leadership in IE represent a higher level analysis, and attempts are oriented to developing theoretical models for IE leadership, that after could be eventually generalized on conventional contexts, not vice versa. There are models of job performance that are applicable across all jobs and those developed for specific occupations. Development of leaders for these unique contexts is a wider social and organizational strategy, in which OP and its duties need to be appropriately legally and organizationally provided, implemented and supported, for successful realization. Training, as well, need to be directly relevant for the DC.

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## RISK ASSESSMENT IN THE PROCESS OF APPLIED EDUCATION FORMS REALIZATION

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***Abstract:** Contemporary conditions imply the need to organize and perform new, innovative forms of applied forms of education. A high level of competence is set as a goal, which is achieved through effective training. Contrary to this, there is a requirement for preservation of human and material resources, as well as the factor of reducing purchase cost, and improving the quality of participants training in the applied forms of education at the same time. As response to such challenges, over the past 20 years, a variety of tools and techniques have been developed that enable the timely detection and forecasting of possible hazards, as implementation of measures to prevent them. Consequently, the risk assessment is crystallized. The assessment is based on the integration of crisis management systems into the decision-making process, timely identification of potential hazards, elimination measures or, ultimately, risk management. In this regard, the article discusses one possible approach to risk assessment and offers an attempt to solve hazard management.*

***Key words:** Risk, risk assessment, risk factors, education*

### 1. INTRODUCTION - DESCRIPTION OF THE PROBLEM

Risk assessment is determination of quantitative or qualitative assessment of the value of an event. A successful risk assessment system is a detailed management of all factors which can cause, in mutual interaction or interaction with the environment, an unwanted event detrimental to accomplishment of the planned goal. The connection of all factors can be seen in the process of applied forms of education, which is a very complex process.

The applied form of education must be dynamic, effective and above all instructive, in order to achieve required level of competence through it. Each of these requests increases likelihood of occurrence of an unwanted event. In order to master the factors and bring the risk to an acceptable measure, it must be managed in all stages of education.

The essence of risk assessment, as a basic tool for preventing unwanted events, is precisely that in phase of preparation for realization of activities, it enables systematic review of all factors that influence realization of individual activities as well as a set of all activities with all connections and subprocesses. In this way, it is possible to manage inaccuracy, insecurity and needs for planned and sustainable engaged resources. Decisions are made with some degree of unreliability of information. This approach shows that the risk assessment process takes place in parallel with the management process in the organization and is related to each individual phase of the management process, and that the peak of its efficiency and necessity reaches in preparation stage.

## **2. RISK –TERM DETERMINATION AND DEFINITION**

Each activity contains a certain level of risk. Contemporary aspects and scope of organization development contribute to the increase in the number of events and activities potentially dangerous to human life, health, work and the environment. Key position in the world of risk took technology, from the aspect of decision making, organization, improvement and harmonization of systemic links between different social structures, systemic analysis of alternative variants at different levels of management and selection of optimal technologies. The above facts speak of the complexity of the conditions for making decisions, due to the increase of uncertainty based on the progress of technology, information technology and the creation of new values in the organizational system. Therefore, in order to consider the risk in terms of its management, the term of risk should first be properly determined.

In the broadest and most general conceptual definition, risk is defined as the possibility of suffering damage or loss, that is, "factor, thing, element or course involving uncertainty and danger." However, the concept of risk not only changes but varies depending on the activity in which it is analyzed, and as such it is differently defined and evaluated. In the context of some value, it implies bringing this value into a situation of being hurt, damaged, or lost. When it comes to endangering, the risk is more specific, more intense and more likely than the challenge.

The risk in the Oxford dictionary implies the likelihood and possibility of danger, loss, injury or other harmful consequences, while according to interpretation in the Economic-Business encyclopedia, the risk means possibility and a certain degree of probability that an event or action with adverse consequences will occur, or the occurrence of damage due to unforeseen events. According to the approaches of various authors, the risk represents:

1. Possibility of loss or injury. This is the most recognizable concept. We have something to lose, perhaps through an accident or "we do not have luck."

2. Potential for negative impact. This is a generic definition. Something can go wrong. Negative impact may be unclear and unknown, but will produce a negative outcome.

3. The likelihood of an unwanted event. This moves us into the world of statistics and quantitative analysis. We see the risk on the horizon. What is the probability of achieving it? What will happen if it happens? Can we quantify the damage? What will be in best case if it happens? What in the worst case?

## **3. RISK FACTORS IN APPLIED FORMS OF EDUCATION**

Sources of risk in applied forms of education are factors that determine the functioning of this process. All factors do not affect the unique way, in terms of time, space and intensity, so their importance is different. The decisive influence has certain characteristics of the factors, whose interaction with the elements of environment creates problems that affect realization of the planned goals. All factors can be classified into four groups: human factor, technical-technological factor, natural factor and social factor.

The human factor has the most significant, practical and primary role in the implementation of applied forms of education. By increasing the quality of human factor, the number of human and technical errors is reduced manifoldly. The human factor gives huge contribution in symbiosis with an increasingly advanced technical and technological factor, which has become more reliable with development and application of new technologies and scientific and technical achievements, with application of results on scientific achievements based on development and improvement of analytical, organizational, managerial and technical methods, techniques and tools. From the aspect of security increasing, reduction of number of human errors was influenced by upgrading of procedures based on results of positive practice. The importance of human factor is also reflected in establishment and consistent

implementation of documented management system, which has the origin in basic norms and regulations, as well as in instructions for implementation of all types of activities.

The technical-technological factor is significant element of efficiency. In conditions of exceptional scientific and technological achievements, the possession of modern technique and technology is a prerequisite for achieving required and necessary level of efficiency. The importance of factors of technological consistency with modern achievements is the limitation of financial resources. Technical capacities represent a reflection of equipment with modern technical means. Lack of required or possessing obsolete technical means, prevents the proper execution of applied forms of education. The following element of technical systems is the keeping and maintenance of technical and material resources, and due to their inadequacy, functionality and reliability of the process of the applied form of education is disturbed. According to Verna, technology represents an effective combination of skills, knowledge and capability of people with techniques and methods, objects and materials, hardware and software resources (machines, tools, computers, programs, procedures and other equipment) for the conversion of process inputs (input resources - data, information, raw materials, materials, energy, etc.) into process outputs (outputs-goods, products and services). Having in mind the need for a high level of correctness and reliability of the technical and technological factor and its modernity, it can be concluded that it represents a major source of risk.

The natural factor represents the living and working environment conditions. According to Andjelkovic, for humans, as well as for every living being, the environment represents a space in which he meets his living needs and requirements by using the available resources. Plants and animals, according to their adaptive abilities, use the necessary environmental conditions that are permanently provided by circulation of matter and by energy flow. Human takes from the environment, or from the environment he has adapted himself, everything that is necessary for his own life, returning to the environment variety of waste materials, some of which are slowly or completely disintegrating (eg, plastic and glass). Environment is often considered as a system of interconnected environments: the natural environment, the social environment, the housing environment, the production environment, the cultural environment, the information environment. Each of these has some kind of influence on applied forms of education.

The social dimension of management is of great significance. It is materialized through internal and external influences. In internal field, the social factor implies social aspects of life, security and preservation of privacy, humane working conditions in the workplace, lack of discrimination, and so on. Safety and health in the applied forms of education is of particular importance. When events that can not be controlled occur, it is necessary to provide care and humane treatment with persons who have suffered damage. Special dimension of the social factor, of external character, are the regulations adopted by the state authorities which have a direct influence on the applied forms of education. The social factor is related to the ethical dimension of organization, standards and expectations that show concern for employees, stakeholders and the wider social community. An ethical element designed through interpersonal relationships in organizational systems generates atmosphere of permanent improvement of working conditions, monitoring of impact on system factors and reduction of negative impacts. It is impossible to avoid the conditions of social influence. Therefore, the social factor is extremely important in the process of applied forms of education.

#### **4. APPLIED FORMS OF EDUCATION**

When the term "education" is used, along with the adjective "applied", it wants to point to a certain type of training whose main goal is to prepare people for work. Applied forms of

education are, in fact, directed to acquiring a qualification for work. By applied forms of education, beside for training of persons for all types and modalities of work, should be trained them for life in the community with the aim of understanding social and labor relations. Therefore, it can be said that professional training implies both training for work and community life training. Those who participate in the activities of applied forms of education should be able to understand both individually or collectively, to affect working conditions and social environment. Thus, the applied forms of education represent the acquisition of skills for work, and as a term means learning, training and practicing. Applied forms of education can be done at the workplace, in a school workshop, or in a workshop of the company. The aim of these activities is to provide professional assistance for vocational training and appropriate workplace. Applied forms of education include a large number of techniques, exercises and efficient procedures for mastering certain skills. The basic goal of education is development of own skills and abilities, and then practical knowledge acquiring.

## 5. RISK ASSESSMENT IN APPLIED FORMS OF EDUCATION

There is no best procedure, or the most accurate way in which a risk assessment will be carried out. There are various methods of risk assessment that are based on research in complex systems, on various processes or on the basis of personal experience and the study of hazardous situations. Procena rizika u primenjenim oblicima edukacije u ovom radu je izvršena po „PILZ“ metodi, gde se rizik računa kao proizvod faktora rizika korišćenjem obrasca: The risk assessment in applied forms of education in this paper is carried out according to the "PILZ" method, where the risk is calculated as the product of the risk factors using the form:

$R = V \times U \times P \times B$ , where is

V = Probability of injury / illness

U = Frequency of exposure to hazards/harmfulness

P = Consequence of possible injury or illness

B = Number of persons exposed to hazards or harmfulness

For definition of risk factor *V - probability of injuries / illness* due to the occurrence of an unwanted event, a scale with 8 levels of ranking is used (Table 1).

**Table 1:** Method PILZ - probability of injury / illness

Probability of injury/illness		
Rank	Numerical value	Qualitative description of probability
1	0,033	Almost impossible – possible only in extreme circumstances
2	1,0	Very unlikely – but still possible
3	1,5	Unlikely – but it can happen
4	2,0	It can happen though it is unusual
5	5,0	There is a chance to happen - 50% possible
6	8,0	Probably – not a surprise
7	10,0	Probably – should expect it to happen
8	15,0	Certainly – it will surely happen

Definition of risk factors U - frequency and time of exposure to hazard/harmfulness are shown in a scale of 6 levels of ranking (Table 2).

**Table2:** Method PILZ - frequency of exposure to hazards/harmfulness

Frequency of exposure to hazards / harmfulness		
Rank	Numerical value	Qualitative description of frequency
1	0,5	Yerly
2	1,0	Monthly
3	1,5	Weekly
4	2,5	Daily
5	4,0	Hourly/every hour
6	5,0	Constantly

A scale with 7 levels of ranking is used to define the risk factor *P - consequence, or the severity of possible injury or illness* (Table 3).

**Table3:** Method PILZ - consequence of possible injury or illness

Consequence of possible injury or illness		
Rank	Numerical value	Qualitative description of the consequences
1	0,1	Scratches / bumps / bruises, etc.
2	0,5	Cuts, lacerations / mild side effects /burns
3	2,0	Fracture of small bones / easier illness (temporary)
4	4,0	Fracture of main bones / heavy illness (temporary)
5	6,0	Loss of eye, hearing, extremity, permanent illness
6	10,0	Loss of vision, more extremities, heavy permanent illness
7	15,0	Fatal injuries – fatal outcome

For defining the risk factor *B - number of persons exposed to hazards or harmfulness* is used a scale of 5 levels of ranking (Table 4).

**Table 4:** Method PILZ - number of persons exposed to hazards or harmfulness

Number of persons exposed to hazards / harmfulness		
Rank	Numerical value	Quantitative description of the number of people exposed to hazards
1	1,0	1 – 2 persons
2	2,0	3 – 7 persons
3	4,0	8 - 15 persons
4	8,0	16 – 50 persons
5	12,0	Over 50 persons

Defining the risk level (R) uses a 5-level scale (Table 5).

**Table 5:** Method PILZ - risk level

Level, or rank of the risk (R)			
Rank	Numerical value	Qualitative description of risks	Conclusion on the size of the risk
1	0-5	<b>Negligible risk</b> - no risk reduction activities are required	ACCEPTABLE RISK
2	6-50	<b>Small risk</b> - there is a risk and protection measures can be defined	
3	51-250	<b>Moderate risk</b> - there is a risk and it is necessary to define measures for reduction	
4	251-500	<b>High risk</b> - a significant risk, it is mandatory to define measures to reduce risk	UNACCEPTABLE RISK
5	Over 500	<b>Very high risk</b> - work with this risk is unacceptable	

Data for application of this method were obtained by interviewing participants of applied forms of education. Based on the obtained numerical risk value, its level is qualitatively described and determines whether the risk is acceptable or unacceptable in order to properly treat the risk.

**Table 6:**Evaluation of risk assessment in applied forms of education by PILZ method review

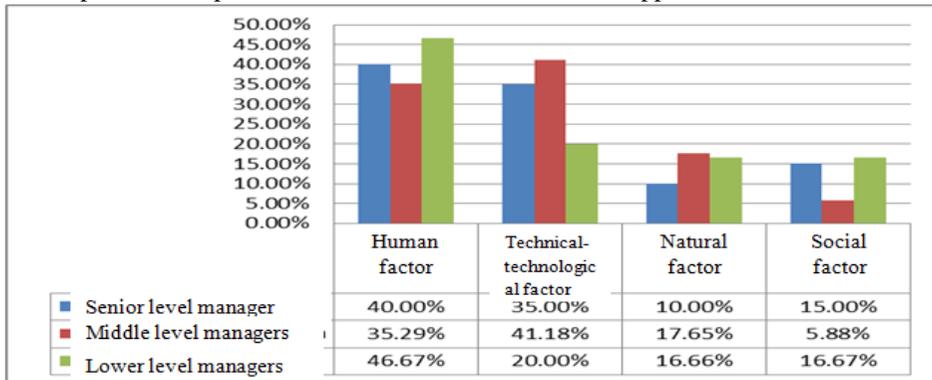
Hazards	Probability of the disease / injuries	Frequency of exposure to hazards	Consequences of possible injury	Number of people exposed to hazards	Level of risk	Conclusion on the size of the risk
Non-compliance with procedures and regulations	1,0	1,0	10,0	1,0	10 SMALL	ACCEPTABLE RISK
Fatigue	8,0	5,0	0,5	4,0	80MODERATE	ACCEPTABLE RISK
Direct control	2,0	1,0	0,5	2,0	2NEGLECTIBLE	ACCEPTABLE RISK
Inadequate communication	1,5	1,5	0,5	8,0	9SMALL	ACCEPTABLE RISK
Invalidity of the means	8,0	1,0	2,0	2,0	32SMALL	ACCEPTABLE RISK
Non-compliant guidelines for using the technique	10,0	0,5	2,0	4,0	40SMALL	ACCEPTABLE RISK
Possibility of cancellation of certain parts and circuits	15,0	1,5	15,0	2,0	675VERY HIGH	UNACCEPTABLE RISK
Non-physiological position of the body	10,0	1,0	2,0	4,0	80MODERATE	ACCEPTABLE RISK
Chemical harmfulness	10,0	1,0	6,0	2,0	120MODERATE	ACCEPTABLE RISK
Physical harmfulness	5,0	0,5	4,0	6,0	60MODERATE	ACCEPTABLE RISK
Biological harmfulness	5,0	0,5	4,0	2,0	20SMALL	ACCEPTABLE RISK
Work longer than working hours	5,0	1,5	2,0	4,0	60MODERATE	ACCEPTABLE RISK
Activity of people in field conditions	8,0	0,5	10,0	2,0	80MODERATE	ACCEPTABLE RISK
Use of technology in field conditions	8,0	5,0	15,0	2,0	1200VERY HIGH	UNACCEPTABLE RISK

## 6. RESEARCH RESULTS

Collection of information was done by submitting the questionnaire in writing form. Questionnaires are distributed directly to respondents (senior managers, middle level managers and lower managerial level), without the involvement of superiors. The time for completing the questionnaire is one day. Having in mind that these are the direct and indirect participants in the applied forms of education and that the problem they are assessing is an integral part of their work and that they significantly influence the risk assessment process, the method of data collection has been adapted from the aspect of understanding the problem in connection with the work they do. It is important to note that the respondents were given the opportunity to supplement the proposed elements in the questions, which in their opinion would increase the quality and scope of the issue. The aim of research is to get an insight into which factors are relevant for the applied forms of education and which factors have the most influence.

By analyzing the responses received from the respondents, the following general conclusion can be drawn as the basis for risk assessment in the applied forms of education: Respondents agree that factors that influence the applied forms of education can be classified into four proposed groups: human factor, technical and technological factor, natural and social factor (Chart 1). The chart shows attitudes of the respondents on the issue of the presence of factors on the occurrence of unwanted events. All categories of respondents agreed that all factors have a certain impact on the occurrence of unwanted events in the process of applied forms of education. Statistics show that a human is an inevitable factor, and in the same way, it is the biggest cause of the danger, which if is not identified on time can become a risk. The survey concluded that the technical and technological factor is the second inevitable cause of the risk. The analysis shows that the interaction between humans and techniques is inevitable, and that the risks of occurrence of a negative effect at one or another value are probable. Of course, the influence of other factors should not be neglected, as they can also cause the occurrence of danger, often more serious than the factors that are "expected" to occur.

**Chart 1:** Opinion of respondents on the influence of factors in applied forms of education



Based on the results of research, it comes to the conclusion that it is necessary that the risk assessment is seriously understood by all participants. Risk assessment aims at improving quality and preventing the occurrence of unwanted events with increased ability, and the implementation of measures that will continuously incorporate the experience of participants in the applied forms of education will contribute to the examination of the right condition, focusing on the most important problems, and in general to increase the safety at work with the means at much higher than the current one. It is evident that there is a difference in opinion and empirical views among different categories of respondents. This situation is caused by the fact that each of the above categories participates in different ways in the process of applied forms of education.

## 7. CONCLUSION

Unwanted events are followers of applied forms of education that require a proper risk assessment of performing and executing assigned tasks. Applied forms of education as one of the most complex tasks with them bear a lot of uncertainty. Many situations that can lead to unwanted events could be avoided by high quality risk assessment in planning. Every such event is a negative experience for the organization, which has an adverse effect.

By researching the area of risk assessment in applied forms of education, it becomes clear that all factors and events need to be given equal attention. Since that standards and criteria are constantly being raised, their increase also increases the likelihood of certain risks arising. The greatest attention should be paid to preventing the occurrence of risk events, not removing the consequences when the events are occurred. It is particularly important to pay attention to the results of research of different categories. There is a clear difference in the perception of risk assessment needs, as well as the perception of the possibility of application.

In previous experience, it has been clearly shown that the defined and imposed measures of risk reduction, protection and safety measures are not unnecessary and required without any basis. On the contrary, in most cases, it turned out that in the cases of their disregarding, it was exactly the event that we wanted to avoid. Therefore, in the coming period, special attention should be paid to their correct determination and precision, and to find ways of motivating participants to respect them. Acceptance and observance of all remarks, risks and consequences can be minimized.

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## CIVIL DEFENSE PLANNING IN THE REPUBLIC OF SERBIA ON A STRATEGIC LEVEL

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***Abstract:** Civil Defense is a field of social action that is of great importance for overall social security. From a state perspective, this activity has to be regulated so that there is maximum control and influence over the system both by state authorities and by those who directly control the system. The fact is that it is necessary that the planning of the civil defense system in each country starts at a strategic level, with the aim of securing a united civil defense system.*

***Key words:** civil defense, strategic planning*

### 1. INTRODUCTION

Human security is more than ever related to the ability of state subjects to react to the danger. In this case, civil defense planning at the strategic level gets special significance, especially in creating conditions for the development of this system. Civil Defense Planning at the Strategic Level implies the incorporation and alignment of science and practice as the fundamental pillars of the development of this system. Conscious of these facts, man, by putting science at the forefront, explores the causes of danger and takes measures to reduce or neutralize their effects. Only by fully comprehending the dangers, the circumstances under which they arise, the causes and ways of manifestation and efficient planning of the development of the abilities of the social community and the civil defense system can effectively respond to their destructive action. In this paper is presented a review of the civil defense planning of the Republic of Serbia at the strategic level.

### 2. PLANNING THE CIVIL DEFENSE IN THE REPUBLIC OF SERBIA

Planning, in general, implies the definition of objectives and the establishment of a comprehensive strategy for achieving these goals and the development of plans for the integration and coordination of activities [8]. Planning is a function that is very closely related to all other management functions - organization, guidance and control. For this reason, planning is also seen as a process of carrying out activities that are necessary for making planned decisions, ie decisions of goals and assumptions for their realization [14]. From the aspect of the civil defense system of the Republic of Serbia, two categories of planning are important: strategic and operational. Since the activities carried out in the civil defense system are complex and always imply major consequences, it is impossible to separate these two categories of planning. Strategic planning is a continuous, iterative process aimed at ensuring the compliance of civil defense systems with its environment [11]. The essence of strategic planning is to provide a timely reaction to changes in the environment. Civil defense system is designed to monitor security changes in the environment at different levels of governance, therefore it is necessary to provide information on the state of the environment, information on the state of the capacity for response and information with the assessment of the development of the situation [11]. Operational planning represents the transformation of strategic ideas and commitments into concrete activities. The iterativity and specificity of the connection between the aforementioned types of planning in the activities of civil defense arise from the fact that

every operational activity is of great importance for the strategic level of planning and management. Information obtained at the operational level, even tactical, on the route through the operational, are of great importance for the correction of the initial plans [1]. The strategic framework of the civil defense system in the Republic of Serbia is defined by the adoption of the National Security Strategy, the Defense Strategy and the Emergency Situations Act. The civil defense system in the Republic of Serbia is in the process of formation, it has its own shortcomings and its weaknesses that are trying to be eliminated, primarily by passing bylaws in this field. In order to eliminate these shortcomings, it is of utmost importance to recognize the location of the civil defense system within the national security system of the Republic of Serbia and the defense system, as shown in Figure 1.



**Figure 1.** Civil defense system within the national security system

**Source:** Krsljanin, D., Karovic, S.: Sistem odbrane u vanrednim situacijama, Vojno delo, DOI: 10.5937/vojdela1504142K

According to the National Security Strategy, the Civil Defense of the Republic of Serbia, as one of the foundations of the defense system, represents the most organized force of the society, which should provide all necessary assistance to the vulnerable population and preserve the environment, material and cultural assets. Although in practice this process has not been fully implemented, the civil defense system must be brought to the level that it can efficiently fulfill all its missions and tasks and provide necessary protection.

### 2.1. Normative documents in the Republic of Serbia of importance for civil defense

The Civil Defense System of the Republic of Serbia is defined by many strategic - doctrinal and other normative documents, as well as many regulations of international legislation. The Constitution of the Republic of Serbia [2] in Article 97 defines the obligation of the Republic of Serbia to regulate and secure "4) the defense and security of the Republic of Serbia and its citizens and measures in the event of a state of emergency", the National Assembly's competence (Article 99) decides on war and peace and declares a state of war and emergency "and 9) adopts a defense strategy. Article 139 defines the place and role of the Serbian Armed Forces, primarily to "defend the country from armed threats from outside and perform other missions and tasks ...", and the competence of the municipality (Article 190) to ensure through its authorities: "4) to protect the environment, protection against natural and other disasters; protection of cultural assets of importance to the municipality".

From the aspect of strategic vision and normative regulation, a document of importance for civil defense is certainly the National Security Strategy [17]. The starting document for defining a national security strategy is a national strategy. The guidelines given in the national strategy are, in a security sense, operationalized in the national security strategy. So,

the national security strategy is a fundamental document that defines at the highest level the basic long-term postulates for the construction and development of national security. The operationalization of the national security strategy is carried out through specific strategies, different doctrines, security policy and legal solutions.

The defense system is a subsystem of the national security system. In a large number of countries, the defense system consists of a management system, a military system, a civil defense system, and an intelligence and logistics system. The Defense Strategy Guidelines and Policies are regulated by the Defense Strategy. Modern democratic societies through the defense strategy enforce generally accepted standards of defensive organization of modern societies [11]. Defense strategy, as a strategic document in the field of defense, takes a significant place because it also looks at the aspect of civil defense. Namely, in the conditions of war, but also in the conditions of peace, when security is impaired by natural disasters and other disasters, the state is at the disposal of the state with significant capacities of the civil defense system. In modern states, the defense system is not only dimensioned for carrying out military operations, but also for assisting and supporting civilian authorities in the event of non-military challenges, risks and threats. On the other hand, the defense system enables fast and efficient filling of civil protection units with required specialties. The Defense Strategy of the Republic of Serbia [18] is a basic strategic document that directs the engagement of defense resources. It is based on the Constitution of the Republic of Serbia and the National Security Strategy. The Strategy defines 10 (ten) challenges, risks and threats to the defense of the Republic of Serbia, one of which is one that represents a permanent security threat to the population, material goods and the environment: "natural disasters and chemical, biological, nuclear, technical and technological accidents ", which do not know the boundaries and can endanger the territories of neighboring countries. One of the three basic goals of the defense policy is the formation of an "effective civil defense system", while one of the basic tasks is "effective management of the civil defense system" [18].

Among the documents that mostly determine the civil defense system are definitely doctrinal attitudes to civil defense, because they build and develop the system themselves. The Doctrine of Civil Defense provides basic guidance on the goal - why the system is established and what tasks it has, how to accomplish the functions of the system, how to organize the necessary forces and resources and the properties that the system should have to be effective? In fact, the civil defense doctrine gives general answers to the question of what is meant by the civil defense system as part of the defense system of the Republic of Serbia.

Guidelines for the functioning of the civil defense system are also defined in the Law on Defense. According to the Law on Defense of the Republic of Serbia: "Civil defense is exercised by state and administrative bodies, autonomous provinces and local self-government bodies, companies and public services and other entities and forces of the defense system" [5]. The civil defense in the defense system of the Republic of Serbia plays an important role, especially in the preparation of dedicated forces and providing the necessary resources for the implementation of activities of protection and rescue of the population and material goods. As an integral part of the defense system, the civil defense of the Republic of Serbia is legally constituted on the same constitutional and legal basis as the defense of the country as a whole. In this way, the rights and duties of all civil defense system entities, which provide their protection and protection with effective protection, are standardized and their plans and activities must rest on a clearly defined strategy.

## **2.2. Planning civil defense in the Republic of Serbia at the strategic level**

The defense system of the Republic of Serbia is part of the national security system and represents a well-organized and functional whole of defense forces and entities whose goal is protection of defense interests through the realization of military and civil defense. Military defense is the Army of Serbia, and civil defense is state bodies, state administration bodies,

autonomous provinces, local self-government units, companies, public services and other entities and forces of the defense system [3] (Figure 2).



**Figure 2.** Structure of the defense system of the Republic of Serbia

**Source:** Babic, B.: Civilna odbrana Republike Srbije, Vojno delo, UDK: 351.759.6(497.11); 351.862.21(497.11)

Organized and coordinated use of the forces and assets of the civil defense system in the Republic of Serbia requires planning. The civil defense system has its defined guidelines in the National Security Strategy, which are an idea to accurately reflect the reasons for the existence of the system and its development. Civil defense system implies the existence of a process of management and basic process functions of the system: planning, organizing, guiding and controlling. The planning process is the initial process in which the real needs are met with the goals that are to be achieved. In the process of early strategic planning of civil defense, the goals that the system should achieve is primarily defined. After defining objectives, strategies for their realization and integration are established, and at the end of the process, plans are made, as documents that are all verified and materialized. The whole process is based on certain principles that characterize the strategic planning of civil defense in the Republic of Serbia and which are contained in the following:

- Strategic planning of civil defense must also consider the internal and external environment,
- Strategic planning is the future of the civil defense system basic orientation,
- Through the establishment of new goals, strategic planning develops a "living organism" and permanently determines tasks for operational planning,
- Defining objectives refers to all aspects of civil defense,
- Having valid information and conclusions for decision making is a complex process in strategic planning.

Strategic planning of the defense, and therefore of civil defense, is a permanent and continuous process. The final result of defense planning should be a defense system, that is, civil defense, which has all the elements that ensure efficient and effective operation in the conditions of announcement or emergence of danger. Since the state is the carrier of strategic defense planning, it must ensure that the civil defense system is in line with the state authorities with civil defense systems of regional and international systems. The need for harmonization of needs and possibilities stems from several facts [9]:

- Civil defense system is a very expensive system,
- Consists of a large number of interdependent elements,
- There must be a degree of consistency in the use of power and resources.

Taking into account the aforementioned facts, planning of civil defense in the Republic of Serbia includes three types of planning: strategic planning, tactical planning and operational planning. Considering the great connection between the aforementioned types of planning in

the civil defense system, it is necessary to bear in mind that strategic planning is highly dependent on the remaining two and vice versa. Strategic planning of civil defense is defined by top-level documents, the strategic objectives of the civil defense are defined and the ways of realization are determined. This type of planning coordinates the civil defense system in relation to the dangers in the environment and within the territory of the country itself. There is a fundamental difference between the strategic planning of civil defense in relation to other types of planning, for several reasons [11]:

- Strategic planning refers to activities that include an extended time dimension, both in terms of the time required to carry out the activity and the time of perceiving the effects,
- From the aspect of impact, the consequences of a particular strategy need not be visible for a longer period of time, and their possible impact is significant,
- With regard to concentration of effort, aging requires concentration on a smaller number of activities,
- With regard to the decision-making model, the strategy calls for several important decisions, and the implementation implies the permanent adoption of various decisions,
- With regard to distribution, the strategy affects a wide range of activities from resource allocation to daily operations.

These postulates clearly show the complexity of strategic planning of civil defense in the Republic of Serbia and its importance for the long-term development of this system. The well-defined long-term goals of the civil defense system are prerequisites for the development of quality assessments and civil defense plans.

The very process of civil defense planning at the strategic level in the Republic of Serbia should begin with preparations for strategic planning, ie, assessing the need and readiness for the implementation of this process, identifying steps and other important issues in strategic planning, developing necessary plans and identifying key stakeholders in the process, as well as ensuring commitment and support for the realization of strategic planning of civil defense.



**Figure 3.** Civil defense planning model at the strategic level

**Source:** Kovač, M., Stojković, D. (2009). *Стратегијско планирање одбране*, VIZ, Beograd.

Figure 3 provides one of the possible models of strategic planning of a defense system that could be applied to the civil defense system that is an integral part of it.

### 2.3. Defense Plan of the Republic of Serbia

The Defense Plan of the Republic of Serbia represents a document, an outcome from the planning process, which defines objectives and establishes a strategy of the operation of forces with the use of resources and preventive and operational measures. The Defense Plan of the Republic of Serbia defines the tasks of all defense entities in terms of the organization

of forces, measures, means and procedures for the work of state organs and the use of the Serbian Armed Forces and other defense forces in a state of war or in a state of emergency. The Defense Plan of the Republic of Serbia is prepared by the Ministry of Defense and proposed to the Government. From the contents of the Defense Plan of the Republic of Serbia it can be seen that strategic defense planning is carried out through the following planning stages [11]:

- Defining goals,
- Determination of actions for achieving goals,
- Allocation of resources for the execution of planned activities and
- Execution of activities.

In this way, the planning of the forces, means and measures of the defense system is realized [12]. Among the most important items in the Defense Plan of the Republic of Serbia related to civil defense is the decision that companies in the Republic of Serbia that produce and provide certain services are tasked with supplying certain entities of defense in the event of a state of war or emergency, and therefore every company is obliged to have its own supply plan or assistance to a designated defense entity, which is produced on the basis of the delivered excerpts from the Defense Plan of the Republic of Serbia. The Defense Plan is developed at the level of the municipality, city, city of Belgrade and autonomous provinces and they all form an integral part of the Defense Plan of the Republic of Serbia.

### **3. SIGNIFICANCE AND PROBLEMS IN CIVIL DEFENSE PLANNING AT STRATEGIC LEVEL**

Based on the above, it can be concluded that civil defense planning at the strategic level in the Republic of Serbia is of particular importance, despite the numerous problems that arise in this process, primarily due to the division of competences over this system between several ministries.

Functioning of the defense system from the aspect of organization and structure of the system, points to the integrity, complexity and dynamics of systemic treatment in specific circumstances. Established elements of the defense system represent a significant force of society. All this requires defining the modes of use, the necessary executors, their tasks, the rights and responsibilities, the manner of their coordination and the application of the necessary methods. All this points to the enormous importance of civil defense planning at the strategic level, but also to the problems that can arise in the planning process itself. In the strategic and doctrinal sense, the program framework of the civil defense system has been created. Assumptions for the establishment and development of the civil defense system have been created, regulatory normative and strategic-doctrinal ambient for the implementation of civil defense have been provided, and responsibilities and responsibilities have been divided into forces and subjects of defense. The established normative-legal and strategic-doctrinal bases are an essential framework for the use of civil defense systems, but experience from the practical application of the adopted regulations requires a proactive relationship between the community and continuous adjustment and upgrading of regulations. This ensures a complete feedback in the functioning of elements and attributes of the security system of the Republic of Serbia in relation to threats that endanger the development of society as a whole [13].

Strategic planning is critical to the civil defense system. The particular value has a long-term aspect of strategic planning. A system based on strategic planning responds more rapidly to changes in the environment. This fact is particularly important in civil defense systems, since they are designed to respond to disasters. The extent of the accident depends on the need for reaction, from the aspect of speed and from the aspect of the measures taken. Uncertainty, unpredictability and the speed of change are of such a character that civil defense requires

the dimensioning of systems that respond quickly and responsibly to changes. Essential, strategic planning has the function of strategic programming in terms of applying a vision that has been previously defined [15]. Strategic planning is a "school" for a community or a civil defense system. Significance is reflected in the fact that this type of planning does not cover only the civilian defense system, but also all the subjects and population of the community. The civil defense system should be tailored to meet real needs and be able to respond to all the challenges and risks that the population can face, create conditions for more effective protection of the lives, health and property of citizens, and preservation of the environment. The civil defense system should concentrate on similar tasks and services, to specify competencies and specialization and economical and rational use of existing available resources, all of which can be achieved through an efficient planning process. The usefulness of plans in specific situations depends on their perceptions and validity. There are many situations where the plans did not coincide with the situation, although it is assumed that there should be a certain level of agreement on planned activities with the resulting situation, regardless of the degree of complexity of the situation. It is unrealistic to expect that the plan will foresee everything that can happen in the future, especially when it comes to issues that are less known. Thus, strategic planning follows a number of problems, which are more or less represented in practice, but regardless of the frequency, they leave a trail on the timidity and quality of strategic planning.

The civil defense system should be rational, decentralized, purposeful, adaptable and appropriate to the real needs and capabilities of the Republic of Serbia. That's why they require legal and sub-legal acts. If all activities are realized, the risk to population safety will be reduced to an acceptable measure. Most problems in civil defense planning in the Republic of Serbia are related to the lack of material and financial resources at all levels of organization (from state administration to citizens), but most of the problems are related to the following shortcomings: inappropriate organization and implementation of preventive measures, outdated and unreliable equipment and resources, inadequate financing of civil defense system maintenance, inadequate coordination between civil defense system entities, inadequate professional qualifications and technological discipline of available human resources, lack of specialized personnel, insufficient training of professional staff and the competence of various ministries over the system.

Bearing in mind the results of the analysis of the civil defense system in the Republic of Serbia, it can be concluded that the context of the functioning of the civil defense system did not fully survive. It is accompanied by problems in the legal regulations, competencies and functioning of local self-governments. It is a process in which the construction paths are still undefined, and especially conditioned by material and financial means. Many issues remain unresolved in this field, in particular questions of trained and trained personnel who can successfully manage such a system.

#### **4. CONCLUSION**

A significant part of the solution or at least the fight against major accidents is strategic planning. At the national level, it should achieve a visionary orientation of the development of the civil defense system, which is specific to the system in the environment and is capable of responding to the resulting danger in a timely manner. Civil defense is covered by a wide complex of measures and activities of state bodies and institutions aimed at creating the conditions for the successful functioning of the state in the war and other disasters, economy, public services, extracurricular activities and protection of the population and material goods. In view of such a mission, civil defense is essentially a strategic component of the defense system, regardless of the fact that protection and rescue of protected values is primarily carried out at the level of local self-government. Its focus on local self-government does not disperse the capacity to carry out the tasks of protection and rescue, but on the contrary, it

provides enormous advantages for dimensioning the system on realistic bases and its own possibilities. The basic planning document that organizes and coordinates the engagement of forces and resources for civilian purposes at the strategic level is the Defense Plan. In the strategic sense, the defense plan assigns assignments to all system entities. Strategic planning concretizes the guidelines that are defined in the national security strategy, with an emphasis on long-term sustainable activities aimed at the development of a sustainable civil defense system. The Civil Defense System in the Republic of Serbia builds you in accordance with the place and role assigned to it by domestic regulations and regulations of international law, bearing in mind the country's economic system.

Under conditions of uncertainty, in addition to a more complex perception of danger, it is difficult to plan and develop a civil defense system. The importance of an organized approach at the strategic level is of paramount importance. Therefore, civil defense planning has justification for the existence and development of the defense system.

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## THE USE OF THE WASPAS METHOD AND FUZZY THEORY FOR ASSESSING THE FLOOD HAZARD

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**Abstract:** *The paper presents the application of the WASPAS method, checklist and the degree of completeness of the claim in the fuzzy linguistic descriptors, when assessing the hazard of flooding. Because of the relatively large uncertainty of the criterion, a model that significantly improves the solution of the problem is defined. The use of the checklist is described, the fuzzification of linguistic descriptors is made using the degree of completeness of the linguistic descriptor and the application shown in the concrete situation.*

**Keywords:** *fuzzy, linguistic descriptors, check list, the degree of completeness, MCDM*

### 1. INTRODUCTION

As a result of the application of mathematical and quantitative methods in the decision-making process, there is a rapid development of decision-making areas based on a number of criteriaso-calledmultiple-criteria decision making. Multiple-criteria decision making (MCDM)is usually defined as a selection of the best action from the set of previously defined final actions[1]. Problems that are the subject of attention to this area of decision-making have a greater number of criteria (attributes) which are recognized and created by decision-makers, whereby the usual situation is that there is often a conflict between the created criteria.When using the MCDM methods, are not rare casesthat the criteria are of a qualitative character. One way of overcoming this problem is the use of linguistic descriptor-scale, which assigns numerical value to each statement-description of the criteria, for each alternative. By introducing a fuzzy logic, where, unlike conventional sets, one element can more or less belong to a set [2], a more detailed determination and quantification of information is carried out. By the fazification of linguistic descriptors,there are various fuzzy linguistic scales. One of them is described in [3].

### 2. PROBLEM DESCRIPTION

Significant application of this area also has in assessments of the danger of various elemental and other disasters.The problem of assessing the danger of elemental and other accidents is the initial element of protection against these hazards. In this paper, the problem of flood risk assessment was solved.Bearing in mind that the Manual of Methodology for making assessment of vulnerability from natural disasters and other accidents and emergency protection and rescue plans (2017), does not describe in detail the process of flood hazard assessment, unlike[4], nor does SRPS standard A.L2.003 (2017), which assesses flood risk assessment as a set of natural disasters and other accidents, for the purposes of this paper, the criteria for hazard assessment are taken from [4], Table 5.

**Table 5:** Criteria for flood danger assessment [4]

Criteria
K <sub>1</sub> – Cause and character of the occurrence of floods
K <sub>2</sub> – Construction of the flood protection system
K <sub>3</sub> – Character and density of population and size of animal fund, quantity of cultural and material goods
K <sub>4</sub> – Possibility of generating other hazards

The criteria are described in detail in [4]. The values assigned to the criteria belong to a five-step scale. In order to assign a value to a criterion, it is necessary to fulfill certain conditions, or to satisfy most of the elements describing the given value. In certain situations, values are assigned to the criteria, although not all elements of this criterion are met. For example, when assessing the risk based on criterion K<sub>1</sub>, the decision-makers of each alternative define one of five values, according to this criterion. Within each criterion, a description of the conditions for the allocation of the flood hazard value has been carried out. Thus, the following conditions must be met for a low flood risk:

- (1) Increased rainfall for 2 to 4 days.
- (2) Increased snow melting for 5 to 10 days.
- (3) There is no demolition or overflow of embankments.
- (4) The presence of groundwater (up to 10 cm).
- (5) Duration up to 5 days.
- (6) Slow flooding (within 3 to 5 days).

Of course, this value can also be assigned when one of the above conditions is not met. This opens the space for the application of certain methods and techniques that support decision-making processes and take these shortcomings into consideration.

The methodology (criteria and the process of risk assessment) that has been abolished in practice has been taken into account, so a real question can be posed why such a methodology is being considered and improved. In essence, the above methodology provides a flood risk assessment tool across regions/areas, which provides a comparison of the vulnerability of the region, and what can be further used to define priority investments in the flood protection process and similarly. In finally scientific approach in considering and improving various types of risk assessment methodologies is very desirable.

### 3. DESCRIPTION OF USED METHODS

#### 3.1. Description of fuzzy linguistic descriptors , the degree of completeness and checklist

A set of  $T$  fuzzy linguistic descriptors is designed to pass judgment on the criteria criteria for each alternative. The number of the set of linguistic descriptors for the size of the danger is  $T = 5$ : maximum - Max, large - V, medium - S, small - M, minimum - Min.

In order to fuzzy-fication linguistic descriptors, based on [3] introduces a variable - the degree of completeness of the assignment-assertion-linguistic descriptor ( $\Psi$ ), which depends on completeness the assigned linguistic descriptor and an absolutely identical description of the elements ( $\varepsilon$ ) assigned to the linguistic descriptor of the criterion. The value of the degree of completion situated in the interval  $\Psi \in \{0, 1\}$ , and  $\Psi = 1$  describes the absolute completeness of the assigned linguistic descriptor of the criterion (100% complete and absolutely identical description of the criteria elements).

Because a different degree of completeness is introduced in each claim, the left ( $t_1$ ) and the right ( $t_3$ ) distribution of the fuzzy numbers are different for each fuzzy number. When the degree of conviction is maximal ( $\Psi = 1$ ) then  $t_1 = t_2 = t_3$ , ie there is no fuzzy number, but the classical value of the linguistic scale.

By introducing different degrees of completeness, left and right distributions differ from one to another fuzzy number, and are changed according to the expression:

$$\tilde{T} = (t_1, t_2, t_3) = \begin{cases} t_1 = \Psi t_2, & t_1 \leq t_2, & t_1, t_2 \in [1, 5] \\ t_2 = t_2, & & t_2 \in [1, 5] \\ t_3 = (2 - \Psi)t_2, & t_3 \geq t_2, & t_2, t_3 \in [1, 5] \end{cases} \quad (6)$$

where the value  $t_2$  represents the value of the linguistic expression from the linguistic scale, which in the fuzzy number has the maximal membership function  $t_2=1$ .

The variable  $\Psi$  is defined by the following expression and rules:

$$\Psi_j^d = \sum_{k=1}^l \varepsilon_{jk}^d = \begin{cases} \text{if } \varepsilon_{jk}^d = "+" \text{ then } \varepsilon_{jk}^d = 1/l \\ \text{if } \varepsilon_{jk}^d = "-" \text{ then } \varepsilon_{jk}^d = 0 \end{cases} \quad (7)$$

$j = 1, 2, \dots, m$  criteria

$k = 1, 2, \dots, l$  elements of linguistic descriptors

$d \in \{Min, M, S, V, Max\}$

Where  $\varepsilon_{jk}$  represents the normalized value of the element of the linguistic descriptor of the criterion which is assigned, the  $d$ -assigned linguistic descriptor and the  $l$ -number of elements of the linguistic descriptor which is assigned.

The symbols "+" and "-" represent the existence or non-existence of a criterion element, listed in the checklist (Table 1), filled by the decision-maker when evaluating the alternatives by each criterion.

**Table 1:** Example of a checklist for the criterion  $K_x$  to which the fuzzy linguistic descriptor  $S$  is assigned

Criterion $K_x$					
Max	V	S		M	Min
5.1.1	4.1.1	<b>3.1.1</b>	+	2.1.1	1.1.1
5.1.2	4.1.2	<b>3.2.1</b>	-	2.2.1	1.2.1
5.1.3	4.2.1	<b>3.3.1</b>	+	2.3.1	1.3.1
5.2.1	4.3.1	<b>3.4.1</b>	+	2.3.2	1.3.2
5.3.1	4.4.1	<b>3.4.2</b>	+	2.4.1	1.4.1
5.4.1	4.4.2	<b>3.5.1</b>	-	2.5.1	1.5.1
5.4.2	4.5.1	<b>3.6.1</b>	+	2.6.1	1.6.1
5.5.1	4.6.1	<b>3.6.2</b>	+		
5.5.2	4.7.1	<b>3.7.1</b>	-		
5.6.1	4.8.1	<b>3.7.2</b>	+		
5.7.1		<b>3.8.1</b>	+		
		<b>3.9.1</b>	+		

Based on the above, the new values of the fuzzy linguistic descriptors are defined on the basis of the expression (6) as:

$$Min = (\Psi, 1, (2 - \Psi)) \quad (8)$$

$$M = (2\Psi, 2, 2(2 - \Psi)) \quad (9)$$

$$S = (3\Psi, 3, 3(2 - \Psi)) \quad (10)$$

$$V = (4\Psi, 4, 4(2 - \Psi)) \quad (11)$$

$$Max = (5\Psi, 5, 5) \tag{12}$$

Defzification of fuzzy linguistic descriptors is done using the following terms:

$$defuzzy\ T = [(t_3 - t_1) + (t_2 - t_1)]3^{-1} + t_1 \tag{13}$$

$$defuzzy\ T = [\lambda t_3 + t_2 + (1 - \lambda)t_1]2^{-1} \tag{14}$$

where  $\lambda$  is the index of optimism  $\lambda \in [0, 1]$ . Optimism Index is described as believing the decision-makers at risk in decision making. The most common values to be taken are 0, 0.5 and 1 and are used to represent a pessimistic, moderate and optimistic relationship to risk [5]. In this paper, for defuzzification, we used value  $\lambda = 0.5$ .

**EXAMPLE** (it is based on the problem of flood hazard assessment):

Step 1.- Filling in the checklist by the DM for each criterion for all alternatives

**Table 2:** Example of Alternative 1 description [4]

Description of Alternative
At the same time heavy rain, sudden melting of snow and the appearance of ice barriers; Rapid flooding that is not flash flood (within 24 hours); collapse of the embankment (exceeding the applicable flow); blockage or narrowing of troughs, congestion (unadjusted bridge height); legal normative regulations in the drafting phase; protection system (embankment 50% built); no early warning system; there is a partially organized flood protection force of 60% of the required; there is a partial organization of subjects that will react in case of floods (50%).

Unless all elements of the linguistic descriptor are represented, in absolutely identical form, for this element, in the appropriate field, the symbol "-" is entered (it does not exist in the original form). If this is not the case, the symbol "+" is entered (it exists in its original form), (Table 3 and 4).

**Table 3:** Checklist for Alternative  $A_j$  according to criterion  $K_j$  when Max value is assigned

Criterion $K_j$	Elements	Linguistic descriptor / Max	
At the same time heavy rain, sudden melting of snow and the appearance of ice barriers; rapid flooding that is not flash flood (within 24 hours); collapse of the embankment (exceeding the applicable flow); blockage or narrowing of troughs, congestion (unadjusted bridge height);	1	At the same time heavy rain, sudden melting of snow and the appearance of ice barriers	+
	2	Rapid flooding that is not flash flood (within 24 hours)	+
	3	Collapse of the embankment (exceeding the applicable flow)	+
	4	Blockage or narrowing of troughs, congestion (unadjusted bridge height)	+

**Table 4:** Checklist for Alternative  $A_1$  according to criterion  $K_2$  when  $S$  value is assigned

Criterion $K_2$	Elements	Linguistic descriptor / S
Legal normative regulations in the drafting phase; protection system (embankment 50% built); no early warning system; there is a partially organized flood protection force of 60% of the required; there is a partial organization of subjects that will react in case of floods (50%).	1	Legal normative regulations in the drafting phase
	2	Protection system (embankment 50% built)
	3	no early warning system
	4	There is a partially organized flood protection force of 60% of the required
	5	There is a partial organization of subjects that will react in case of floods (50%)

Step 2.- Calculation of degree of completeness ( $\Psi$ )

The calculation is performed using equation (7), as follows:

For criterion  $K_1$  and assigned linguistic descriptor  $Max$

$$\Psi^{Max}_{K_1} = \sum_{k=1}^4 \varepsilon^{Max}_{K_1,k} = \varepsilon^{Max}_{K_1,1} + \varepsilon^{Max}_{K_1,2} + \varepsilon^{Max}_{K_1,3} + \varepsilon^{Max}_{K_1,4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$$

For criterion  $K_2$  and assigned linguistic descriptor  $S$

$$\Psi^S_{K_2} = \sum_{k=1}^5 \varepsilon^S_{K_2,k} = \varepsilon^S_{K_2,1} + \varepsilon^S_{K_2,2} + \varepsilon^S_{K_2,3} + \varepsilon^S_{K_2,4} + \varepsilon^S_{K_2,5} = \frac{1}{5} + \frac{1}{5} + 0 + 0 + \frac{1}{5} = \frac{3}{5} = 0.60$$

Step 3.- Fuzzyfication of linguistic descriptors

Using the expression (from 8 to 12), the fuzzy-fiction of linguistic descriptors is performed:

$$Max^{K_1} = (5\Psi, 5, 5) = (5 \times 1, 5, 5) = (5, 5, 5)$$

$$S^{K_2} = (3\Psi, 3, 3(2 - \Psi)) = (3 \times 0.6, 3, 3 \times (2 - 0.6)) = (1.8, 3, 4.2)$$

Step 4. Defuzzyfication of linguistic descriptors:

Using one of the expressions (13) or (14), the defuzzyfication of the linguistic descriptors is carried out, as follows:

For the optimism index (14) will be used the value  $\lambda = 0.5$  (moderate risk ratio) .

$$\begin{aligned} defuzzy S^{K_2} &= [\lambda t_3 + t_2 + (1 - \lambda)t_1] 2^{-1} = [0.5 \times 4.2 + 3 + (1 - 0.5) \times 1.8] / 2 = \\ &= [2.1 + 3 + 0.9] / 2 = 3 \end{aligned}$$

After the defuzzyfications, we will form the initial matrix of decision-making and use a MCDM methods.

### 3.2. WASPAS method

Method WASPAS (Weighted Aggregated Sum Product Assessment) was developed in 2012 and published in 2013 [6]. The method is a combination of two MCDM approaches, i.e. weighted sum model (WSM) and weighted product model (WPM).

The starting point for computing the WASPAS method is the initial decision matrix:

$$X = \begin{bmatrix} x_{11} & x_{12} & x_{13} & \cdot & \cdot & \cdot & x_{1n} \\ x_{21} & x_{22} & x_{23} & \cdot & \cdot & \cdot & x_{2n} \\ x_{31} & x_{32} & x_{33} & \cdot & \cdot & \cdot & x_{3n} \\ \cdot & \cdot & \cdot & & & & \cdot \\ \cdot & \cdot & \cdot & & & & \cdot \\ \cdot & \cdot & \cdot & & & & \cdot \\ x_{m1} & x_{m2} & x_{m3} & \cdot & \cdot & \cdot & x_{mn} \end{bmatrix} \quad (15)$$

where  $m$  is the number of alternatives, and  $n$  is the number of criteria.

In the following section, the procedure for implementing the WASPAS method, ie its mathematical formulation, consisting of 4 steps:

*Step 1. Normalization of values in the decision matrix* - is a linear normalization of the decision matrix elements using the following two expression:

For benefit criteria

$$\bar{x}_{ij} = \frac{x_{ij}}{\max_i x_{ij}} \quad (16)$$

For cost criteria

$$\bar{x}_{ij} = \frac{\min_i x_{ij}}{x_{ij}} \quad (17)$$

where  $\bar{x}_{ij}$  represents the normalized value of  $x_{ij}$ .

*Step 2. Calculation of the criteria of optimality*

This step based on two criteria of optimality. The first is criterion of weighted success (similar to WSM method), i.e. the total relative importance of  $i$  th alternative, and it is calculated by following expression:

$$Q_i^{(1)} = \sum_{j=1}^n \bar{x}_{ij} w_j \quad (18)$$

where  $w_j$  represents the weight (relative importance) of significance (weight) of  $j$  th criterion.

The second criterion, according to WPM method, is calculated by following expression:

$$Q_i^{(2)} = \prod_{j=1}^n (\bar{x}_{ij})^{w_j} \quad (19)$$

*Step 3. Determininig of the total relative importance of  $i$  th alternative* -is obtained on the basis of the following expression:

$$Q_i = \lambda Q_i^{(1)} + (1 - \lambda) Q_i^{(2)} \quad (20)$$

When the value of  $\lambda$  is 0, WASPAS method is transformed to WPM, and when  $\lambda$  is 1, it becomes WSM method [7].

*Step 4. Ranking the alternative*

A set of alternatives is ranked based on the value of the total relative importance assigned to each alternative.

**3.3. Determining the weight of the criteria**

In [8] describes several methods for determining the weight of the criteria based on their rank, among others is a linear weight method with a variable coefficient of direction (LWM).

*Linear weight method with variable coefficient of direction* [8]and[9]:

$$w_r = 100 - s_n(r - 1) \quad (21)$$

where is:  $w_r$ - weight ,  $r$  - rank,  $s_n$ - absolute value of the coefficient of direction.

Alfares and Duffua have empirically determined the value  $S_n$ :

$$s_n = 3.19514 + 37.75756 / n = 3.19514 + 37.75756 / 4 = 12.63453 \quad (22)$$

where  $isn$  - the total number of criteria.

By applying Linear weight method with variable coefficient of direction, using expressions (21) and (22),the obtained values of weight coefficients are shown in Table 6:

**Table 6:** Values of the obtained weight coefficients using the LWM method

Criteria	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	K <sub>4</sub>
Weight coefficients( $w_r$ )	0.30	0.28	0.22	0.20

**4. RESULTS AND DISCUSSION**

After the obtained weight coefficients, the conditions for the application of the WASPAS method are created by defining the initial decision matrix (X)

$$X = \begin{matrix} & \begin{matrix} K_1 & K_2 & K_3 & K_4 \end{matrix} \\ \begin{matrix} A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{matrix} & \left[ \begin{matrix} S & M & Max & M \\ M & Max & V & S \\ Min & S & Max & V \\ V & M & S & Min \\ Max & Min & M & Max \end{matrix} \right] \end{matrix} \quad (23)$$

By applying the checklist and the expressions from (6) to (12), the conversion of the linguistic descriptors into fuzzy numbers was made, after which, using the expression (14),  $\lambda=0.5$ , defuzzyfication was performed and a final decision matrix was formed, which will be used in mathematical calculations:

$$X = \begin{matrix} & K_1 & K_2 & K_3 & K_4 \\ A_1 & \left[ \begin{array}{cccc} 2.86 & 2 & 4.89 & 2 \\ 2 & 5 & 4 & 3 \\ 1.08 & 3 & 4.89 & 3.80 \\ 3.75 & 2 & 3 & 1 \\ 4.85 & 1 & 2 & 1 \end{array} \right. \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{matrix} \quad (24)$$

In the first step, the normalization of the elements of the initial decision matrix was performed. The expression (16) was used for normalization. The obtained results are shown in the normalized matrix ( $N$ ).

$$N = \begin{matrix} & K_1 & K_2 & K_3 & K_4 \\ A_1 & \left[ \begin{array}{cccc} 0.762778 & 0.400000 & 1.000000 & 0.526316 \\ 0.533333 & 1.000000 & 0.818763 & 0.789474 \\ 0.288889 & 0.600000 & 1.000000 & 1.000000 \\ 1.000000 & 0.400000 & 0.614072 & 0.263158 \\ 1.293651 & 0.200000 & 0.409382 & 1.268797 \end{array} \right. \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{matrix} \quad (25)$$

Second step includes the calculation of the criteria of optimality using expressions (18) and (19). The results are presented in Table 7.

**Table 7:**Criteria of optimality

$Q_i^{(1)}$	$Q_i^{(2)}$
0.666096	0.627401405
0.778023	0.755895907
0.674667	0.597174977
0.599728	0.532143057
0.787919	0.593171381

In the third step was performed determining of the total relative importance of  $i$ th alternative, using expression (20). Table 8 gives the obtained values of  $Q$  and the ranking of the alternative is displayed.

**Table 8:**Criteria of optimality and ranking of alternatives

Alternative	$Q_i$	Rank
$A_1$	0.646749	3
$A_2$	0.766959	1
$A_3$	0.635921	4
$A_4$	0.565935	5
$A_5$	0.690545	2

After applying this methodology, alternative  $A_2$  was chosen as a locations with the highest danger of flood.

## 5. CONCLUSION

Increasing sophistication in risk management, a shadowy understanding of human behavior and advancement in technology that supports and imitates cognitive processes improves

decision making in all aspects of life [10]. Undoubtedly, deciding is one of the most important aspects of shaping the future, especially in situations where human lives and material goods are endangered, as in the case of natural disasters. By introducing a checklist for evaluators, it is easier for less experienced people to assess the flood hazard, because the assessment process is carried out according to a particular scheme, so the decision maker does not have to doubt whether and to what extent he considered all the parameters on which to make a decision, and in the case of conventional decision making, certain segments, which play an important role, can be neglected.

Results obtained using the checklist, degree of completeness and WASPAS method show that the use of methods and techniques in the field of MCDM can help decision-makers i.e. can successfully evaluate defined alternatives.

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## SIGNIFICANCE OF SPATIAL PLANNING AND GIS TECHNOLOGY IN REDUCING NATURAL DISASTER EFFECTS

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**Abstract:** *We could say that the last decade is characterized by an extremely unfavorable trend of precipitation regime. Changes in the hydrological regime, long-lasting droughts, extreme rainfall of high intensity and short duration, and antropogenic activity, cause more frequent and devastating floods, torrents and landslides. Negative effects of the above-mentioned processes have been intensified by inadequate spatial planning. In this regard, drawing up a space vulnerability map, monitoring and using GIS databases could be used by spatial planners and other users, in order to reduce, in the long term, the costs of rehabilitating and avoiding human losses.*

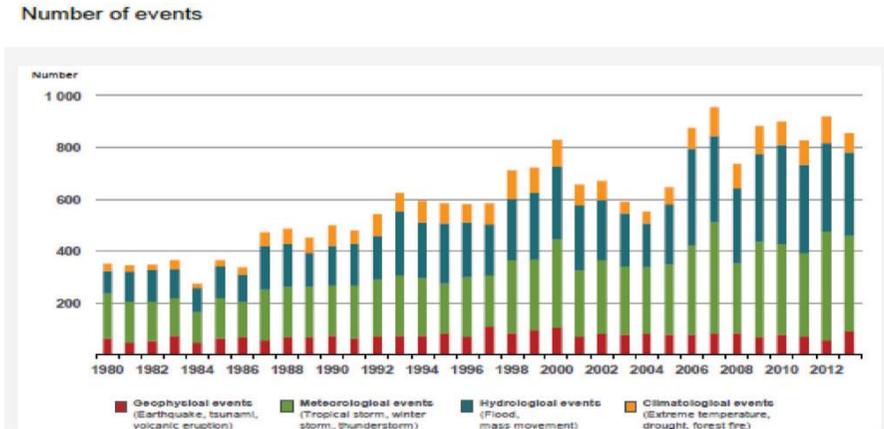
**Keywords:** *Spatial planning, GIS technology, natural disasters*

### 1. INTRODUCTION

Natural disasters have a significant impact on the social and economic development of each country. Although it is clear that weather and climate extremes can not be avoided, it is also clear that, with their timely and accurate announcement, along with strengthening the ability of society to prepare and adapt to the changes that have occurred, they can significantly mitigate or avoid their negative consequences.

Natural phenomena such as floods, landslides, volcanoes, earthquakes, storms, etc. become natural threats when they break normal life, cause victims, cause economic damage and damage to the natural and built environment. In general, we can say that in this case, they are the cause of the hazard. Actual exposure to threats call risk (Eng. Risk), a collection of realized result directly or indirectly harmful to people and / or goods, we call disasters or accidents (Eng. Disaster).

All natural processes on Earth that cause a loss of human life and great material damage are called hazardous natural processes or natural hazards. The size and frequency of these processes depends on many factors, primarily climatic, geological, hydrogeological and morphological characteristics, and vegetation. Due to increasingly occur (Figure 1), their impact on society and the economy is therefore increasing, so are the efforts of society by mitigating and preventing the emergence of greater consequence.



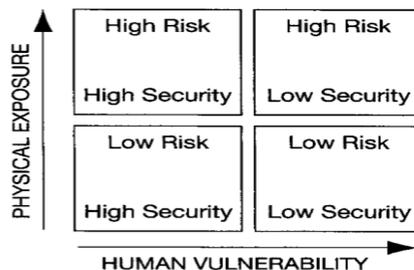
**Figure 1:** Hazardous natural processes, 1980-2012.

Source: *Geo Risk Research, NatCatService*

Natural processes in themselves, they would never have been able to become disasters, in the absence of people, which actually indicates that planned and planned human activities in space would reduce the consequences of such events, which are in accordance with the particularities of the same. On the other hand, the increase in the population, accompanied by the process of urbanization and increased pressures on natural resources, and land conversion combined with natural hazards, lead to increased vulnerability, both people and material goods. It seems that by this sequence of events, a man is found in scissors of opposing processes, which are locked against humanity, but not in the desired way by man.

In order to reduce future losses, to avoid disasters, it is necessary to reduce risk exposure. How this issue is complex and how to resolve it complex, we can use examples of developed, wealthy countries, which despite very high safety and development of mitigation capacity, though not completely avoid the negative consequences of natural disasters.

As a consequence or a cause of increasing the frequency and intensity of certain natural processes, we can mention another very important factor-climate change. Climate change or climate variability, regardless of whether they were talking about the first or second category, also reflect on the frequency and strength of many types of extreme events, such as floods, torrents, heat waves, droughts, storms, and through this and on many other hazards ( eg landslides, forest fires) that are not directly related to weather or hydrological conditions. It is generally known that global and regional climate change, linked to global warming on Earth, can significantly affect the rise in natural hazards, regardless of the fact whether a society is more developed or not.



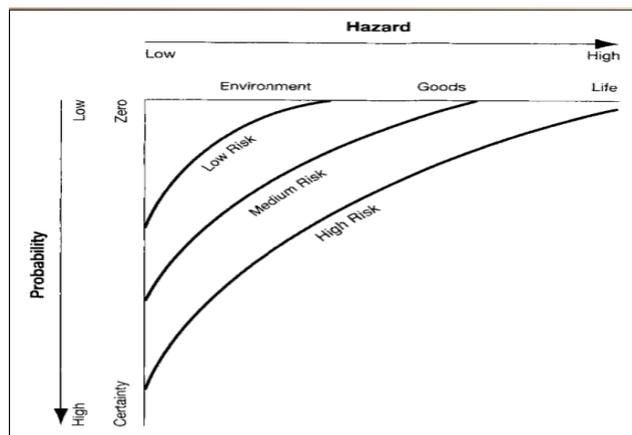
**Figure 2:** Relation of Physical Exposure and Vulnerability

Source: *Smith&Petley: Environmental Hazards*

So, for example, The United States, which, although exposed to numerous environmental threats, has succeeded in applying many measures that significantly reduce the consequences and limit the loss of natural disasters, primarily due to development. On the other hand, poor countries, which are also physically exposed to environmental threats, and who have high sensitivity, have high risk and low security from natural disasters, (Figure 2). Bosnia and Herzegovina also belongs to a group of countries that are significantly exposed to numerous environmental threats such as floods, landslides and floods, but unfortunately also belongs to a group of countries with very low mitigation capacities.

## 2. ASSESMENT OF NATURAL DISASTER RISK

The risk of the occurrence of a particular event (and thus of the natural hazard) can be defined as the product of the probability of the event and the consequences that occur in the event of an event. The probability of the event depends on the strength of the natural hazard; as natural hazards strength becomes, the lower the probability of its occurrence (Figure 3). The main problem in risk assessment is the lack of measurement to quantify the probability of occurrences of natural hazards. According to Nakić (2010), the acceptable risk of natural hazard depends on the nature of the hazard and it is difficult to determine it, as it often depends on the subjective assessment of an individual or the whole society in a completely specific situation.



**Figure 3:** Theoretical relationship between environmental hazard, probability and risk  
*Source: Moore , 1983*

Disaster risk reduction is implemented through a systematic effort of the entire society through reducing risk exposure to danger, reducing vulnerability of people and property, better land management practices and improving preparedness for potential disasters. In addition, according to Mitchell (2003), it is essential to include efforts to reduce the risk of catastrophes in development programs and spatial planning at all levels of government, but at the same time.

Disaster Risk Reduction focuses on three major components of disaster risk, hazard, vulnerability and exposure (DFID, 2006). Since, most of the danger comes independently of man, and of the forces of nature, it is the human ability to reduce their potential impressions, rather weak. But the vulnerability and exposure of society can be significantly improved through planned human activities. On the other hand, human activities need to be adapted to potential hazards. Reduction of vulnerability requires understanding of the basic factors that create the danger and understanding of their actions. In this regard, spatial planning, and the application of modern technologies, such as, GIS have an important role in reducing the risk of disaster (Hadžić et al., 2017).

### **3. THE ROLE OF SPATIAL PLANNING IN DISASTER RISK REDUCTION**

Inclusion of spatial planning issues in preventing consequences and reducing the risk of disasters is of paramount importance. Spatial plans should include risk maps in order to understand the possible consequences of a disaster and to develop the development on a sustainable basis. In that sense, the human activities planned and implemented in accordance with the determined risk. It should be noted that the risk can not be completely avoided, or that there is so-called acceptable risk or exceptions that can be applied, depending on the type and purpose of land use. The center of attention should be the local community, which will first feel the consequences and deal with the consequences of disasters. Accordingly, it should have certain powers in spatial planning, but emphasizing the need for a comprehensive planning of space, not only at the level of the municipality, but also at higher levels, to the state and even beyond.

Spatial planning measures are, by their nature, non-structural and preventive. The development of various types of documents in the field of spatial planning (strategic and detailed spatial plans) and their implementation can greatly influence the reduction of the negative consequences of disasters.

In order to reduce the risk of disaster, strategies for risk disaster risk management at the national level should be adopted and integrated through spatial plans. Building a strategy for disaster risk reduction in spatial planning will improve the level of competence of society and increase its safety and functionality. This process, however, needs to be carefully designed, as there are great differences not only between countries but also within one country. Although not directly responsible for reducing the risk of disasters, spatial planning plays a fundamental role in reducing the risk of disaster. Spatial planning is responsible for the decision on long-term land use. According to Fleischhauer and others (2005), there are four possible roles in spatial planning to reduce the risk of disasters:

1. Prohibiting future development in certain areas. In areas where there is an increased risk of disaster, if it is already occurring, the development should be prohibited. Areas needed for immediate response and retention must be free.
2. Classify different land use setting for disaster prone areas. Every disaster has their own acceptable risk on different land use classes. Steep slope which is highly susceptible to landslide should not be us for residential or commercial area, but may still be suitable for plantation.
3. Regulating land use or zoning plans with legally binding status. In an area vulnerable to earthquake, regulation on building density is essential to reduce impact of building collapse.
4. Hazard modification. Spatial planning can play role in promoting soft engineering method to reduce risk of flooding. Retarding basin required to contain flood water should be keep free of development to maintain its function

### **4. RELATIONS BETWEEN DISASTER MANAGEMENT AND GIS**

The harmful effects of natural disasters, which are a sudden occurrence and cause environmental, financial and human loss, can be prevented or minimized if society is sufficiently prepared. Natural disaster management involves monitoring specific events, predicting their possible occurrence and warning immediately after a natural disaster. It also includes works on the prevention of natural disasters. If a natural disaster occurs, readiness should be shown in managing appropriate procedures and providing assistance. The management of natural disasters also includes the implementation of disaster recovery plans. Geographic Information Systems (GIS) can be used to manage the planning, emergencies during and after natural disasters. GIS is a tool for integrating, storing, editing, analyzing, and visualizing spatial data. GIS is a tool that can provide concise and up-to-date information needed by responsible persons in assessing a natural disaster at any stage. The use of GIS

combines data from different sources (eg road data, population density, relief, vegetation, hospitals, etc.) and visualize them in a unique way before, during or after a natural disaster. When natural disasters occur, a large number of people and institutions are working together. The use of GIS provides the ability to quickly share data between command centers involved in rescue before, during or after a natural disaster.

In spite of the stated advantages of using GIS during a natural disaster, there are some limitations. This includes the possibility of lack of data, lack of organization, inadequate models, software problems and the inability to recognize the needs of end users (Cova, 1999). These constraints should be overcome by creating a spatial data infrastructure that would allow for their efficient use and exchange.

A very good example is the online platform<sup>33</sup> - "System for Risk Analysis of disaster" (Dras), which provides up to date information to decision-makers and citizens about exposure to floods and landslides in the area of Tuzla and Dobož. DRAS has three modules, the first available to the public and accessible to all citizens, while the other two are intended for municipalities.

## **5. NSDI AND DISASTER MANAGEMENT**

Spatial data infrastructure (SDI's) aim to facilitate and coordinate the exchange, sharing, access and use of geospatial data and include networked spatial databases, connectivity mutual institutional, organizational, technological, human and economic resources (Groot and McLaughlin 2000; Rajabifard and Dr, 2002; Crompvoets et al., 2004; USF, 1994).

National Spatial Data Infrastructure (NSDI) is a set of technologies, measures, norms, implementation rules, services, human resources and other factors that enable the effective integration, management and maintenance of the sharing of spatial data for the purpose of meeting the needs at national and European level (Kljucan et al., 2018). The purpose of establishing the NIPP is to rationalize the collection of spatial data and to standardize them so that they can be networked and used in a quality way. Connecting different types of spatial data and their interoperability will allow users to conduct complex searches and analyzes and connect with the space. Thus, the assumptions for modern and efficient management of space and spatial resources, which directly stimulates and increases economic growth, will be realized (Poslončec-Petrić et al., 2011). Successful implementation of the spatial data infrastructure depends to a large extent on information technologies. The ICT framework defines ICT architecture and standards in order for IPP to function in an efficient and interoperable way. The IPP technology framework includes hardware components and resources (repository / database servers, application servers, file systems, computer network devices), and IPP software components (operating systems, spatial data management systems, application servers, Geoportal, metadata editor, user management system) (Ključinin I dr 2018). Managing and accessing various sets of spatial data (collected in different institutions) is carried out through IPP GeoPortal. IPP Geoportal users can read in the IPP metadata catalog, all data properties and how to use them for their own needs. In the case of natural disasters, Geoportal IPP allows quick access to a large set of spatial data and the rapid integration of various data sets, their processing and presentation of appropriate analyzes and queries. On the basis of the obtained results, quality decisions can be made on how to act in areas affected by natural disasters.

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<sup>33</sup> made within the project "Disaster Risk Reduction Initiative" (UNDP). Publicly accessible parts of DRAS can be accessed via <https://dras.undp.ba/>.

## **6. THE PROTECTION AND RESCUE SYSTEM IN B&H AND THE PROPOSAL OF MEASURES FOR IMPROVEMENT**

Having in mind the somewhat more complex constitutional structure of Bosnia and Herzegovina, the area of planning and financing in case of civil emergency situations is characterized by a somewhat different form of organization and management of this sector than in the case of neighboring countries. Thus, according to the defined territorial organization of Bosnia and Herzegovina, units of local, city, cantonal, entity and state administration, (within their rights and obligations determined by law), organize, plan, educate, organize, finance and implement a system of protection and rescue. The structure and functioning of the existing system of protection and rescue in B&H at all levels of its organization makes it very complex and therefore insufficiently functional [13]. In 2009, B&H adopted a methodology for the assessment of the vulnerability of Bosnia and Herzegovina to natural and other disasters [14], through which, among other things, guidelines for the development of the B&H Endangered Threat Assessment, were defined, in order to identify and analyze risks and mitigation measures to increase safety and protection of people and material goods from natural or other disasters. The assessment of vulnerability was done at state level as well as at entity levels. Through these documents are: identified main risks of all kinds that can cause natural or other disasters, both in Bosnia and Herzegovina and those with transboundary effects; the exposure of people, property, critical infrastructure to all major hazards is estimated; risk sizing was performed, risk hazards based on hazard assessment, exposure to hazard and vulnerability, (risks within Bosnia and Herzegovina or cross-border risks), their likelihood, causes and consequences (expressed in human, material and / or financial losses). Plans for protection and rescue of natural or other disasters of institutions and bodies in Bosnia and Herzegovina and the Program for the development of the system of protection and rescue of institutions and organs of Bosnia and Herzegovina have been developed, based on the B&H Endangerment Assessment.

Also, as a member of the United Nations, Bosnia and Herzegovina, in line with the conclusions of the UN World Disaster Reduction Conference held in January 2005 in Kobe, was obliged to establish a disaster risk reduction platform, which was done 2013 year, [15]. The platform is formed as a forum for the exchange of opinions that encompasses all the factors of the society from different fields of activity that will offer the best solutions in their domain in order to prevent and better protect against disasters. This includes the harmonization of attitudes on disaster risk reduction activities, hazard risk assessment, harmonization of activities, encouragement and achievement of the highest quality response to threats and disaster risks and the development of the population's awareness of the existence of a disaster hazard.

Of course, besides these, a number of other efforts have been made, both at state, and at entity, also cantonal and municipal levels, to bring the Protection and Rescue System to an appropriate level.

However, it is evident that in Bosnia and Herzegovina for the complete and timely response to emergencies, the integration of information and communication infrastructure and the monitoring system in BiH is missing. In this way, automatic, accurate, reliable, timely and consistent data collection services (starting with hydrological, meteorological, geological, pedological and other necessary data), adequate data storage and improved access to databases and information would be provided to all actors in the planning and implementation of the protection system, as well as others who are directly or indirectly involved in space planning. As an important and inevitable element in spatial planning, disaster risk reduction strategies should be developed as integral, interdisciplinary and intersectoral documents.

It is necessary to establish a consistent system for predicting natural disasters on a common IT platform to provide information on potentially dangerous events, to all competent authorities at the state and entity levels, cantonal and municipal, and thus to increase social, economic and environmental security. It is necessary to establish a spatial data infrastructure through which it will be possible to connect various types of spatial data, and their use in real time, as well as conducting complex searches and analyzes related to space. Education, as an important factor not only in the development of society, can greatly contribute to increasing the resilience of society in order to reduce or, at best, avoid possible disasters. In B&H it is necessary to improve the level of education of citizens, starting from preschool and elementary education, secondary school, through higher education, but also through lifelong learning training. It is also necessary to improve curricula at existing faculties, and higher education institutions, in order to increase the resilience of the society, and introduce new professional studies to deal with this issue. The study of the benefits of establishing a spatial data infrastructure and the use of GIS in teaching processes should be significantly improved, since its current application is sporadic, even at technical faculties. In order to enable the preparation of the necessary analyzes and assessments related to the discussed space, it is also necessary to increase the application of advanced technologies in practice (the lack of staff that advanced technologies can use). For this reason, European funds should be used even more, which encourage an adequate change of existing ones and the establishment of new curricula.

## **7. CONCLUSIONS**

The current approach to the defense of society against natural disasters was largely random, with a pronounced effect after the occurrence of certain disaster for the purpose of saving people and goods, as well as reconstruction. However, in the new century, with the increased frequency of occurrence of certain disasters, the emphasis is increasingly on prevention. Of crucial importance is the inclusion of efforts for disaster risk reduction in development programs and regional planning at all levels, but at the same time. The establishment of national spatial data infrastructure, it can also be a significant factor in increasing the resistance of society.

An important factor of prevention is the development of strategies to reduce the risk of disaster, which consists of assessing vulnerability and mapping risks from certain natural disasters. Their integration into spatial plans, with the use of modern technologies (such as GIS), could greatly contribute to reducing the consequences of natural disasters.

We must not forget the huge potential that lies in education. Namely, education, as an important factor, can greatly contribute to increasing the resilience of society in order to reduce or, at best, avoid possible disasters.

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## SELECTION OF MEDIUM FOR MILITARY EDUCATION PROMOTION

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***Abstract:** In the paper a hybrid model based on analytic hierarchy process (AHP) and multi - criteria compromise ranking (VIKOR) is presented, applied through selection of the best medium for military education promotion. The AHP method is used for determination of criteria weight coefficients, while VIKOR method is applied in order to be found the best medium by selection amongst numerous concrete options – alternatives.*

***Key words:** media, military education, AHP method, VIKOR method.*

### 1. INTRODUCTION

The promotion of military education has great influence on quantity and quality of candidates who applied for studying at University of Defence (hereinafter: UoD). It is being conducted throughout recruitment process and precedes the selection of candidates for enrolling Military Academy, Medical Faculty of Military Medical Academy, Military High school and Expert Military High School (hereinafter: military schools). It is to be expected that from candidate`s quantity come, by predefined selection activities and procedures, quality human resources who will continue their education in military schools. It is necessary for promotion to be well planned, systematized and guided. It is also necessary to define lasting period, activities, participants (promoters and target population), design slogans, arrange posters and provide media support. The selection of media support depends, in most cases, on limited funding provided with that purpose and, very often, the only criterion is just advertising price. However, by thorough analysis of all relevant factors, it is possible to come to conclusions which may refer to selection of optimal medium (or more of them) for military education promotion, in order to attract large number of candidates, choose those that suit the needs of the defence system most and send them to UoD.

In this paper, the method of analytic hierarchy process (AHP) and multi - criteria compromise ranking method (VIKOR) are being used for problem solution.

### 2. PROBLEM DESCRIPTION

The focus on the paper is given on finding hybrid model which will allow optimal selection of medium for military education promotion. The adequate promotion of all values inherited in Serbian Army, such as patriotism, honor, honesty, dedication to profession, loyalty, bravery, discipline, solidarity, humanity, dignity and devotion, is the essence of survival and development of R. Serbia security system in whole. Serbian Army, the institution that enjoys the highest trust amongst citizens<sup>34</sup> has to represent the bastion of basic social values and

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<sup>34</sup> According to the Study of service consumer`s content, as a part of Project of real estate management (project REMP), which has been conducted by Republic Geodetic Authority with World bank financing, it is shown that 57

place where is possible for young people before all, to fulfill their ambitions, but also the place where they can put their capabilities, skills and potentials in the service of motherland. The only way to bring closer these values to potential candidates is through instruments of mass communication. All of them are used with goal to „so that members of targeted group could be informed about position of the Republic of Serbia on international level, its function and institutional values, and also about possibilities provided by Serbian Army in a role of employer, build sense of involvement and affiliation and, as many as possible, to decide for military vocation“ [1]. In the concrete problem, the targeted group is consists of pupils of high schools<sup>35</sup> and the eighth grade of elementary schools<sup>36</sup>. In process of problem solving the instruments of mass communication are limited on one part of mass media (television, radio and the press<sup>37</sup>).

### 1.1 MASS MEDIA

The media of mass communication (mass media) Radojković i Milenković define as „... technical – technology structures, arose by set of artificial and, partly, natural conditions, with its own possibilities of symbolic expression, namely specific `language`, by which, from one or more communication centers, the messages are being distributed towards unlimited multitude of individuals – mass audience“[2] In social sciences, mass media are related to mediums or communication channels, with purpose of transmitting information to large number of people. The kinds of mass media are books, newspapers, magazines (the press), film, radio, television, recorded audio and musical material and internet. All of these kinds can be categorized in three groups: the press, emitting and digital technologies. Taking into account the fact that the advertisement is „...paid form of persuasive communication in which mass and interactive media are used to reach wide audience, and with purpose of connection of familiar sponsor with customers, providing information about products (goods, services, ideas) and representing products through prism of needs and desires of the customers“[3], it is clear that this way of military education promotion is expedient, and above all, effective, efficient and economical.

### 1.2. DESCRIPTION OF MEDIA SELECTION CRITERIA

In order to apply AHP and VIKOR methods successfully for solving the problem of research, it is necessary to identify criteria which are being common for all three listed and considered media of mass communication and among which the selection of the best media for military education will be conducted. Taking this into account, the following criteria are identified:

K1 – The advertising price – This criterion is expressed by cash units and represents the amount which is necessary to pay for advertising. The total advertising price by television, radio and the press is given by next expression:

$$C_u = C_d * N_d \tag{1}$$

Where is:

C<sub>u</sub> – Total advertising price

C<sub>d</sub> – Advertising price on daily basis<sup>38</sup>

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percent of citizens mostly believe Serbian Army. The research was conducted from the end of 2016 until the beginning of 2017, on nationally representative sample of 1.500 citizens of the Republic of Serbia, consist of 60 percent city and 40 percent rural inhabitants from six regions - Vojvodina (27 percent), Belgrade (22), Western Serbia (13), Eastern Serbia (nine) and Southern Serbia (13)

<sup>35</sup> In a focus of interest are pupils of high school ending grades as potential candidates for Military Academy and Medical Faculty of Military Medical Academy

<sup>36</sup> Potential candidates for Military High School and Expert Military High School

<sup>37</sup> For solution of particular problem under term of „the press“ daily newspapers are being implied as the widest press medium.

Nd – Number of days of advertising <sup>39</sup>

K2 – The share in the overall advertising market – This criterion is expressed in percentages and represents the share of concrete media house in the overall advertising market by certain medium.

K3 – Representation of target group – This criterion is expressed in percentages and reflects the representation of concrete medium in target group, i.e., it reflects the percentage of target group that `consumes` a particular medium.

K4 – The availability of the medium– This criterion represents the coverage of the Republic of Serbia territory (by emitting or distribution)<sup>40</sup> and it is described by linguistic descriptors, given in Table 1.

**Table 1:** Descriptive scale of linguistic criteria

Linguistic descriptors	Very poor	Poor	Medium	Good	Excellent
Assigned number value	1	2	3	4	5

K5 – The price of accessing a medium – This criterion is expressed by cash units and represents the amount which is necessary to pay in order to make the content of particular medium available.<sup>41</sup>

The characteristics of listed criteria are given in Table 2.

**Table2:** Criteria characteristic

	<i>ben</i> <sup>42</sup>	<i>cost</i> <sup>43</sup>	Qualitative	Quantitative
K <sub>1</sub>		+		+
K <sub>2</sub>	+			+
K <sub>3</sub>	+			+
K <sub>4</sub>	+		+	
K <sub>5</sub>		+		+

## 2. APPLIED METHODS

The hybrid model which is used for military promotion selection consists of AHP and VIKOR method. AHP method is used for determination of weight coefficients of identified criteria, while VIKOR method is used for finding compromise solution, specifically for selection of optimal medium for military education promotion.

### 2.1. AHP METHOD

The AHP method which was developed by Thomas Saaty in the beginning of seventies, stands for a tool used in decision analysis, created for providing assistance to decision

<sup>38</sup> The advertising price on daily basis level by television and radio is the price for advertisement spot which lasts for 30 seconds and is being emitted three times per day regardless of terminus and order in advertisement block. The price for advertising in daily newspapers is money amount for daily rent of a half of the advertising space page.

<sup>39</sup> In the concrete research is 60 days, for how long the public concurs for enrolling military schools lasts in average.

<sup>40</sup> For electronic media (television and radio), it is significant if they are media with national frequency or media that cover certain region of the Serbia, while for the press (newspapers) is essential if they are distributed on a whole territory or they are local.

<sup>41</sup> For electronic media total amount represents sum of all expenses such as purchasing television set or radio receiver, costs for electricity, broadcast costs, special fee for using public service etc., while for the press it represents amount which has to be paid for certain newspapers, magazines and similar.

<sup>42</sup> Subset of criteria with *benefit* characteristics, which means that higher value of criterion is preferable, i.e., better.

<sup>43</sup> Subset of criteria with *cost* characteristics, which means that lower value of criterion is preferable, i.e., better.

makers in resolving complex decision making problems in which participate many decision makers, numerous criteria and in various time periods. This process is based on balance concept which is used for determination of overall relative attributes set significance, activities or criteria, and it is related to analyzed decision making problem[4]. In the paper, this method is used for determination of criteria weight coefficients regarding a selection of media for military education promotion. For pairwise comparison, the standard Saaty's nine level scale is used, given in Table 3 [5]. The Saaty's scale is applied by decision-makers or analysts performing comparisons in pairs on the basis of semantic preferences from the left column of the Saaty's scale, or by direct association. Number values in columns two or three of Table 3, which correspond to the semantic preferences in the left column, are entered in the square comparison matrix. (2).

**Tabela 3:** Saaty's pairwise comparison scale

Definition	Standard values	Reciprocally values
Equal importance	1	1
Weak importance of one over another	3	(3)
Essential or strong importance	5	(5)
Demonstrated importance	7	(7)
Absolute importance	9	(9)
Intermediate values between the two adjacent judgments	2,4,6,8	(2), (4), (6), (8)

$$A = \begin{matrix} & C_1 & C_2 & \dots & C_n \\ \begin{matrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{matrix} & \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix} \end{matrix} \quad (2)$$

Since it is true that  $a_{ij} = 1/a_{ji}$  i  $a_{ii} = 1$  for every  $i, j = 1, 2, \dots, n$ , the matrix A is positive, symmetrical and reciprocal. When applying the classic Saaty's scale, relations in the pairwise comparison are strictly defined [6].

## 2.2. METODA VIKOR

The VIKOR method is found out by Serafim Opricović [7]. This method is developed on a basis of elements from compromise programming with the beginning at „border“ forms of Lp-metrics. This metrics represents distance between the ideal point  $F^*$  and point  $F(x)$  in a space of criteria functions [8].

The first step in VIKOR method is the beginning decision matrix:

$$D = \begin{matrix} & X_1 & X_2 & X_3 & \dots & X_n \\ \begin{matrix} W_1 \\ W_2 \\ W_3 \\ \vdots \\ W_m \end{matrix} & \begin{matrix} X_{11} & X_{12} & X_{13} & \dots & X_{1n} \\ X_{21} & X_{22} & X_{23} & \dots & X_{2n} \\ X_{31} & X_{32} & X_{33} & \dots & X_{3n} \\ \dots & \dots & \dots & \ddots & \vdots \\ X_{m1} & X_{m2} & X_{m3} & \dots & X_{mn} \end{matrix} \end{matrix} \quad (3)$$

By decision matrix m alternatives and n criteria are defined. Every criterion is associated with its weight coefficient  $w_i$ . The criterion weight coefficients should follow next condition:

$$\sum_{i=1}^n w_i = 1 \quad (4)$$

After defying the decision matrix, the method is to be applied. Next step in VIKOR method is determination of  $x_i^*$  and  $x_i^-$ , which is conducted by expressions:

$$x_i^* = \max(x_1, x_2, \dots, x_n); i=1, 2, \dots, n; \quad (5)$$

$$x_i^- = \min(x_1, x_2, \dots, x_n); i=1, 2, \dots, n; \quad (6)$$

Next step in VIKOR method is determination of pessimistic ( $S_j$ ) and anticipated ( $R_j$ ) solutions.

$$S_j = \sum_{i=1}^n w_i (x_i^* - x_{ij}) / (x_i^* - x_i^-); j = 1, 2, \dots, m \quad (7)$$

$$R_j = \max_i [w_i (x_i^* - x_{ij}) / (x_i^* - x_i^-)]; j = 1, 2, \dots, m \quad (8)$$

After that, follows the step of compromise solution  $Q_j$  calculation:

$$Q_j = \nu \frac{S_j - S^*}{S^- - S^*} + (1-\nu) \frac{R_j - R^*}{R^- - R^*}; j=1, 2, \dots, m \quad (9)$$

Where:

$$S^* = \min S_j \quad (10)$$

$$S^- = \max S_j \quad (11)$$

$$R^* = \min R_j \quad (12)$$

$$R^- = \max R_j \quad (13)$$

Where is:  $\nu$  – the weight of the most criteria strategy satisfaction,  $\nu \in \{0.25, 0.5, 0.75\}$ .

The last step in the VIKOR method is ranking of alternatives. The set of alternatives can be ranked by value of criteria function, which are assigned to each alternative  $Q_j$ . The best alternative is one that is the least distanced from ideal value, i.e., the one that has minimal  $Q_j$  value and vice versa. As relevant, the rank list is taken for value  $\nu = 0.5$ , but even though it is the first on the list, that action has to meet two more conditions [8]:

1) There has to be enough advantage (more than “minimum enough advantage”) related to the second, the third and other alternatives, and that is established by following expression:

$$Q(\alpha) - Q(\alpha') \geq DQ \quad (14)$$

$$DQ = \min(0.25, \frac{1}{m-1}) \quad (15)$$

Where  $\alpha$ ,  $\alpha'$  represent the values of the first and the second alternative, respectively, by  $Q_j(\nu=0.5)$ , and  $m$  represents the number of alternatives. The minimum enough advantage is to be 0.25 ion cases when there is a small number of alternatives.

2) It has to have enough stable position, i.e., to have the first position according to rank list  $QS_j$ , or according  $QR_j$ , or according  $Q$  for  $\nu = 0.25$  i  $\nu = 0.75$  where is [8]:

$$QS_j = \frac{S_j - S^*}{S^- - S^*}; j = 1, 2, \dots, m \quad (16)$$

$$QR_j = \frac{R_j - R^*}{R^- - R^*}; j = 1, 2, \dots, m \quad (17)$$

### 3. REPRESENTATION OF HYBRID MODEL APPLICATION

As already stated, the hybrid model consists of AHP and VIKOR method. The criteria weight coefficients are calculated by AHP method in Expert Choice program package and the results of that process are given in tables 4 and 5.

**Table 4:** Criterion pairwise comparison according to the Saaty`s scale

	K1	K2	K3	K4	K5	
K1			3.0	(2.0)	9.0	2.0
K2				(4.0)	2.0	(2.0)
K3					5.0	3.0
K4						(3.0)
K5	Incon: 0.03					

**Table 5:** Criteria weight coefficients values



Inconsistency = 0.03

with 0 missjudgments

In the purpose of VIKOR method application, six different alternatives have been chosen (from  $A_1$  to  $A_6$ ) by which the beginning decision matrix is defined, given in Table 6. The alternatives  $A_1$  i  $A_2$  represent television,  $A_3$  i  $A_4$  radio stations, and  $A_5$  i  $A_6$  daily newspapers.

**Table 6:** The beginning decision matrix

Criterion	K1	K2 <sup>44</sup>	K3	K4	K5
Alternatives	0.300	0.092	0.406	0.051	0.151
$A_1$	6000 <sup>45</sup>	50	45	5	6
$A_2$	8000	48	60	4	5
$A_3$	600	5	35	3	0.3
$A_4$	750	4	40	2	0.35
$A_5$	4800	22	10	4	2.4
$A_6$	4300	18	8	1	1.8
$x_i^*$	<b>600</b>	<b>50</b>	<b>60</b>	<b>5</b>	<b>0.3</b>
$x_i^-$	<b>8000</b>	<b>4</b>	<b>8</b>	<b>1</b>	<b>6</b>
Characteristic of criterion	min	max	max	max	min

By resolving the expressions form 5 to 13 the final solutions are given, presented in Table 7.

**Table 7.** The final values of alternatives

Alternatives	QSj	QRj	Qj (v=0.5)	Qj (v=0.25)	Qj (v=0.75)
A1	0.463	0.252	0.357	0.305	0.410
A2	0.353	0.576	0.465	0.520	0.409
A3	0.040	0.156	0.098	0.127	0.069
<b>A4</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
A5	0.938	0.936	0.937	0.936	0.937
A6	1.000	1.000	1.000	1.000	1.000

According to the given results, the final ranking of alternatives is: **A4, A3, A1, A2, A5, A6**.

#### 4. ANALYSIS OF SENSITIVITY

When applying the methods of multi – criterion decision making, it is crucial to examine the sensitivity of mathematical model which is being used, so the decision makers could have some sort of guarantee according to rationality and quality of given solution. The analysis of

<sup>44</sup> According to the last analysis of media market in Serbia, conducted by Ipsos Starategic Marketing agency in 2015 (The regulative body for electronic media, 2015) it comes to conclusion that television is the lead medium with market share of 53%, the press 20% and radio 4% (other media have market share of 23%).

<sup>45</sup> All prices are given in RSD

sensitivity of results given by hybrid model implies on examination of criterion weight changes and on solution consistency regarding the change of measurement scale.

When examining the change of criterion weight, six scenarios have been developed (Table 8) (A – equal importance of all criteria, B – absolute dominance K1, C - absolute dominance K2, D - absolute dominance K3, E - absolute dominance K4, F - absolute dominance K5). In a frame of independence analysis regarding the change of measurement scale, two scenarios have been developed (Table 9). In the first scenario qualitative criterion (K4) has been given by two different scales (S1 i S2) which are connected by positive affine transformation ( $y = 2x - 1$ ). In the second scenario quantitative criteria (K1 i K5) which represent a certain advertising expenditure and cost of accessing the medium expressed in cash units, are given by two different scales (S1) in RSD and (S2) in euros.

**Table 8:** Analysis of sensitivity regarding criterion weight change

Scenario	A	B	C	D	E	F
Alternative	Rang alternativa					
A <sub>1</sub>	4	4	3	5	3	2
A <sub>2</sub>	1	2	5	3	4	3
A <sub>3</sub>	5	6	2	4	1	6
A <sub>4</sub>	3	1	1	1	5	1
A <sub>5</sub>	6	3	6	6	6	4
A <sub>6</sub>	2	5	4	2	2	5

**Table 9:** Independence analysis regarding measurement scale change.

Scenario	Scenario 1		Scenario 2	
	S1	S2	S1	S2
Alternative	Rang alternativa			
A <sub>1</sub>	5	5	5	5
A <sub>2</sub>	3	3	3	3
A <sub>3</sub>	2	2	2	2
A <sub>4</sub>	1	1	1	1
A <sub>5</sub>	5	5	5	5
A <sub>6</sub>	6	6	6	6

## 6. DISCUSSION AND CONCLUSION

According to the results of sensitivity analysis of developed hybrid model for selection of the best medium for military education promotion, it comes to conclusion that hybrid model completely satisfies set goal. The sensitivity analysis of criterion weight change shows that hybrid model is sensitive enough and that keeps alternative priorities (in this particular case it favors A4 alternative). Furthermore, checking consistency of solution by changing the measurement scale shows that the model is stable and that gives sustainable solutions. By analysis of all given results, it could be concluded that application of AHP and VIKOR method can help significantly to decision makers to find out necessary solution.

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## COMPARATIVE ANALYSIS OF EVACUATION SCENARIOS USING SOFTWARE MODELLING

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**Abstract:** *When assessing the risks in catastrophic consequences and fires, the time needed for evacuation is of particular importance, especially for facilities with a large number of people. In order to improve the occupant's awareness and preparedness for timely, safe and efficient evacuation in case of emergency, the research aim is to optimize the evacuation design models in engineering practice. Modelling and simulation are modern and useful tools for developing various scenarios and play an important role in obtaining dynamic information about the evacuation process, the critical path and the critical points of the evacuation route. A comparative analysis of two different evacuation scenarios of the Teaching block, Faculty of Technical Sciences in Novi Sad was performed, using a software simulation model for the evacuation in case of fire. The results of an experimental simulation of evacuation can provide a basis for assessing the safety of the user, in case of fire in public buildings in which gathers a large number of people.*

**Keywords:** *Evacuation modelling software, fire safety, comparison, simulation.*

### 1. INTRODUCTION

The importance of determination of evacuation time is essential for safety of the occupants and it represents the basis for life safety assessment in case of emergencies. Considering large number of various factors affecting evacuation time, realistic estimation and understanding of behaviour of the occupants during fire is challenging and difficult to predict. Empirical data also could be provided by practicing evacuation drills, and compare the results to simulation experiments. Use of calculation models enables the analysis of various scenarios, and more accurate results.

At this time, there are many tools for developing virtual scenarios, which could provide the information and represent the bond between realistic people behaviour during fire and hand calculation evacuation method. Further development and applying of simulation and modelling are starting point for gathering dynamic information about evacuation process. It is offering possibility of graphical presentation of results and information about critical points of evacuation, as well as faster creating of different scenarios.

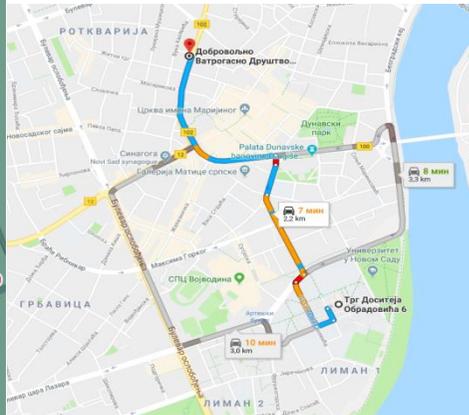
Two possible evacuation scenarios of Teaching Block at Faculty of Technical Sciences in Novi Sad were designed by applying modelling and simulation software and compared in the scope of this research.

### 2. BASIC DATA ON THE BUILDING

Faculty of Technical Sciences (FTS) is located in the central part of the University campus in Novi Sad, in Liman I city area. It consists of 7 buildings and one of them is Teaching Block (Figure 1).



**Figure 1:** University campus in Novi Sad:  
Position of Faculty of Technical Sciences:  
Number 7- Teaching Block



**Figure 2:** Fire brigade's access roads to the location: 1-Primary route (blue color),  
2-Alternative route (gray color)

Access roads to the location from the Professional fire-fighting-rescue unit Novi Sad are paved roads, of adequate width and capacity for movement of fire-fighting vehicles. Distance from professional fire-rescue unit to the location by primary, as well as by alternative route, is 3 km (Figure 2). Estimated time of arrival is 7 minutes.

Teaching Block is a public building within FTS and consists of a cellar, ground floor and 5 storeys. As the height of the last building's floor does not exceed 30 meters in relation to the surrounding ground (24m), building does not belong to the class of high-rise buildings.

The bearing structure is made of reinforced concrete - framed structural system, with reinforced concrete shear walls. The external walls are made of brick and the roof structure is wooden. Building's vertical communication is a two-way staircase positioned along the west facade of the building - with natural lighting. The building contains additional external fire escape. Exit to the staircase is approachable on all above-ground floors, from the central hall. External staircase is not fire-separated from the building with fire doors.

According to the Regulation on the classification of buildings, activities and lands in fire risk categories, the building belongs to II.9. category: public and commercial buildings with more than 1,000 persons gathering. Capacity of building is about 3000 people. Number of occupants in the building per floor is given in Table 1.

**Table 1:** Number of occupants in the building per floor

Floor	Number of people
Basement	360
Ground floor	290
I floor	550
II floor	790
III floor	460
IV floor	440
V floor	100
<b>Total number of people</b>	<b>2990</b>

### 3. EVACUATION SIMULATION SOFTWARE MODEL

The evacuation simulation model has been created using simulation software – Pathfinder, which uses integrated users interface and 3D visualization of results [5]. The software operates with basic object characteristics, as well as number of occupants, their speed and different evacuation paths.



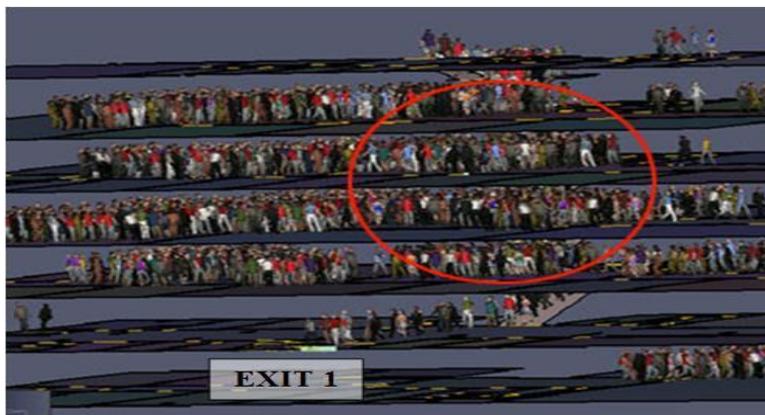
**Figure 3:** Evacuation exits

In the case study two different evacuation scenarios were analysed and the evacuation time via different exits in Teaching Block were compared (Figure 3).

The walking speeds are defined by technical recommendations SRPS TP 21: in the interval of 1.2m/s - 1.5m/s. Evacuation model includes the maximum number of people – 2990.

#### 3.1. Scenario 1

In the first scenario, all occupants are evacuated through the main staircase, under the assumption that the exit to the fire escape is locked. Calculation includes the maximum number of people present in the building, although 650 of them are located in the basement and on the ground floor, in which case they are not using main staircase for evacuation. As people from the upper floors are moving downstairs, they meet the other occupants from lower floors, which cause accumulation of occupants between third and second floor. This scenario represents the worst possible scenario. Total evacuation time is 45,6 minutes, taking into consideration a lot of dead locks and slowdowns, as people move downstairs. Critical point of evacuation is represented on Figure 4.



**Figure 4:** Critical point of evacuation

### 3.2. Scenario 2

In the second scenario, the evacuation is conducted via two different evacuation paths - 1100 occupants are evacuated via the main staircase, and 1240 of them are directed to the external emergency staircase. People from the basement level and ground floor are using EXIT 1 for evacuation, without obstructing the main staircase. Critical points are identified on all floors of fire escape, because the number of people exceeds capacity of stairs (Figure 5). Despite the fact that this scenario considers decreased usage of main staircase compared to the first scenario, staircase on third and fourth floor are crowded, while occupants from lower floors can evacuate directly to EXIT 1 (Figure 6). By directing people to distinct exits, evacuation time is decreased by 9.4 minutes.



**Figure 5:** Evacuation via external emergency staircase



**Figure 6:** Evacuation via main staircase

## 4. CONCLUSION

A case study of evacuation modelling was carried out for the building within the Faculty of Technical Sciences in Novi Sad. The results of experimental simulation of evacuation in scenario 1 indicate that evacuation time is too long (45.6 minutes), with high risk level. Adding the second exit in scenario 2 decreases evacuation time to 36.2 minutes, but risk level is still high, due to people crowding at external staircase.

In order to perform safe evacuation in case of fire, it is necessary to prevent crowding of the occupants. One of the solutions is to open third exit in the ground floor (Figure 7).



**Figure 7:** Disposition of exits after opening EXIT 3

A number of preventive measures could be designed based on evacuation modelling results, which are basis for the assessment of life safety in the case of fire in public buildings with the large number of occupants. Software modelling enables better overview of various situations, with possibility of comparing evacuation paths. Further development of simulation software is of a great importance for life safety in case of emergencies.

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## THE ENVIRONMENTAL IMPACT OF BIOTEHNOLOGY: THE EUROPEAN UNION LEGISLATION AND PRACTICE

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**Abstract:** *The paper deals with the problems of environmental and food safety, with specific regard to the impact of biotechnology on the environment and on human health. In particular, specific attention will be reserved to the legislation and the recent jurisprudence developments on genetically modified organisms (GMOs) in EU law. In fact, the problem of genetically modified organisms and of the adequacy of the current European legislation on GMOs has recently brought back to the attention of the Court of Justice of the European Union. Even in the most recent Judgments, the traditional difference in position between the Member States (or, at least, those with a stronger agricultural tradition) and the European Commission, re-emerges. A difference attributable to the evaluation of general requirements of different order and nature. While the States, in fact, seem to favour the environmental protection and the protection of public health, the European Commission safeguards, in line with its mission, the economic and commercial needs, which are the object of priority attention at the EU level. After all, the European Commission has always looked at the biotechnology sector as a strategic sector for the EU economy, as it is able to strengthen technological and industrial competitiveness, as well as the development and employment opportunities in the European Single Market's area.*

**Key words:** *environment, biotechnology, GMOs, Court of Justice of the European Union, European Commission*

### 1. INTRODUCTION

Biotechnologies have always been considered by the European institutions (and by the European Commission in particular) as a potential vehicle for economic development, since they are able to strengthen technological and industrial competitiveness, as well as employment opportunities in the European Single Market's area.

Nevertheless, biotechnologies are also likely to have an immediate or potential negative impact on the environment. Precisely in order to balance the potentialities for economic development on the one hand and, on the other hand, the risks to the environment and human health, over the time a wide regulatory framework has been launched by the European Union. This regulatory framework (consisting of Directives and Regulations launched since the 1990s) has repeatedly been the subject of disputes at the level of the Member States; disputes that have often led the national courts to refer the matter to the Court of Justice of the European Union for a preliminary ruling, in order to clarify certain controversial aspects. This has also happened recently, and especially with regard to agroindustrial biotechnologies and GMOs. In fact, the problem of genetically modified organisms and of the adequacy of the current European legislation on GMOs has recently brought back to the attention of the Court of Justice. In particular, in July 2018 the Court, asked for a preliminary ruling by the French Council of State, has ruled on whether new GMO techniques (concerning organisms obtained by mutagenesis) fall under the EU Directive on the deliberate release into the environment of genetically modified organisms (n. 2001/18/EC, on which we will return later). On this occasion the Court of Justice of the European Union has added to the definition of "GMOs" (with all the rules and precautions that this implies) the organisms

resulting from a technique hitherto considered "non-GMO". The case between several associations for environmental protection and the French Ministry of Agriculture, concerning the refusal to revoke the national legislation according to which organisms obtained by mutagenesis are not, in principle, considered to result in genetic modification, and the refusal to ban the cultivation and marketing of herbicide-tolerant rape varieties obtained by mutagenesis, has had considerable media coverage in France and will be subject to specific analysis in a subsequent paragraph. In another important and recent Judgement of 14 March 2018, rendered in a ruling between TestBioTech eV and the European Commission (supported by multinational companies such as Monsanto and Pioneer Hi-Bred International), the Court has clarified some important aspects concerning the concept of "environmental law" with specific regard to genetically modified products and their EU legal rules laid down by the Regulation (EC) No 1829/2003 (which will be analysed in the following paragraph). Moreover, with the Judgment of December 15th 2016 on the case *TestBioTech and Others v. Commission*, the Court has ruled on the legitimacy of the 2013 Decision of the European Commission authorising the placing on the market of products containing, consisting of, or produced from a genetically modified type of soybean. In this case the Court has dismissed the action of some German non-profit organisation for environmental protection for annulment of the mentioned 2013 Decision. Even in these recent Judgments, the traditional difference in position between the Member States (or, at least, those with a stronger agricultural tradition and part of their public opinion to which the associations for environmental protection often give voice) and the European Commission, re-emerges. A difference attributable to the evaluation of general requirements of different order and nature. While the States, in fact, seem to favour the environmental protection and the protection of public health, the European Commission safeguards, in line with its mission, the economic and commercial needs, which are the object of priority attention at the EU level. After all, the European Commission has always looked at the biotechnology sector as a strategic sector for the EU economy, as it is able to strengthen technological and industrial competitiveness, as well as the development and employment opportunities in the European Single Market's area. This difference of approach and priorities has characterised the confrontation between the States and the Commission on GMOs since the 1990s and is reflected in a significant national and EU case law, which will be traced in its main stages (Judgments *Greenpeace*, 2000; *Monsanto*, 2003; *Land Oberösterreich and Austria v. Commission*, 2007; *Monsanto SAS et al. c. Ministre de l'Agriculture et de la Pêche*, 2011; *Pioneer Hi Bred Italia Srl c. Ministero delle Politiche agricole alimentari e forestali*, 2012, *Fidenato*, 2013), to reach the recent cases mentioned above. Before analysing this confrontation that took place at the EU jurisdictional level, we have to precise that this happened above all because of the attempt made by the member States to carve out spaces of autonomy for themselves with respect to the rules laid down by the Community legislation in the field of GMOs. We will now briefly trace the legislative EU framework for GMOs, in order to to assess how the Member States have sought to waive at these norms to prohibit, in the whole or in part of their territory, the cultivation or placing on the market of GMOs.

## **2. AGROINDUSTRIAL BIOTECHNOLOGIES IN THE EU LAW**

Moving now to analyse the regulatory EU framework on agroindustrial biotechnologies and, specifically, on GMOs, we have first of all to recall that genetically modified organisms (GMOs) (GMMs) can be defined as organisms (and micro-organisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating or natural recombination. The technology is often called "modern biotechnology" or "gene technology", sometimes also "recombinant DNA technology" or "genetic engineering". It allows selected individual genes to be transferred from one organism into another, also

between non-related species. The most common types of GMOs are genetically modified crop plant species and include genetically modified maize, soybean, oil-seed rape and cotton varieties. Such varieties have, in the main, been genetically modified to provide resistance to certain insect pests and tolerance to specific herbicides. The European Union legislation on GMOs has been in place since the early 1990s. The EU introduced specific legislation on GMOs, expressly to protect its citizens' health and the environment while simultaneously creating a unified market for biotechnology. The basic EU discipline on GMOs is set forth in the following Directive and Regulation. First of all, the Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms, which is a 'horizontal' Directive, regulating the experimental releases and the placing on the market of genetically modified organisms. Secondly, the Regulation (EC) No 178/2002 is of fundamental importance because it lays down the general principles and requirements of food law, the procedures in matters of food safety and establishes the European Food Safety Authority (EFSA). Regulation 1829/2003 on GM food and feed regulates the placing on the market of food and feed products containing or consisting of GMOs and also provides for the labelling of such products to the final consumer. The detailed rules for the implementation of Regulation 1829/2003 have been dictated by the Regulation 641/2004. Later, the Regulation 1830/2003 has regulated the issue of the traceability and labelling of GMOs and the traceability of food and feed products from GMOs. It has introduced a harmonised EU system to trace and label GMOs and to trace food and feed products produced from GMOs. Finally, it should be remembered the Directive 90/219/EEC, as amended by Directive 98/81/EC, on the contained use of genetically modified micro-organisms (GMMs), that regulates research and industrial work activities involving GMOs and GMMs under conditions of containment. This includes work activities in laboratories. About the release into the environment, the main features of Directive 2001/18/EC are, first of all, the introduction of the principles for the environmental risk assessment. In particular, as the safety of GMOs depends on the characteristics of the inserted genetic material, the final organism that is produced, the receiving environment and the interaction between the GMO and the environment, the objective of the environmental risk assessment is to identify and evaluate potential adverse effects of the GMO(s). These include direct or indirect, immediate or delayed, effects taking into account any cumulative and long term effects on human health and the environment which may arise from the deliberate release or placing on the market of that GMO(s). The environmental risk assessment also requires evaluation in terms of how the GMO was developed and examines the potential risks associated with the new gene products produced by the GMO (for example toxic or allergenic proteins), and the possibility of gene-transfer (for example of antibiotic resistance genes). The methodology of the risk assessment traced by the Directive is based on the following phases: identification of any characteristics of the GMO(s) which may cause adverse effects; evaluation of the potential consequences of each adverse effect; evaluation of the likelihood of the occurrence of each identified potential adverse effect; estimation of the risk posed by each identified characteristic of the GMO(s); application of management strategies for risks from the deliberate release or placing on the market of GMO(s); determination of the overall risk of the GMO(s). The Directive 2001/18/EC also establishes the procedure for approval of the release of GMOs into the environment. Under the Directive, a company intending to market a GMO must first submit an application to the competent national authority of the Member State where the product is to be first placed on the market. The application must include a full environmental risk assessment. If the national authority gives a favourable opinion on the placing on the market of the GMO concerned, this Member State informs the other Member States via the European Commission. If there are no objections by other Member States or the European Commission, the competent authority that carried out the original evaluation grants the consent for the placing on the market of the product. The product may

then be placed on the market throughout the European Union in conformity with any conditions required in that consent. If objections are raised and maintained, a decision has to be taken at EU level. The Commission first asks for the opinion of its Scientific Panels composed of independent scientists, highly qualified in the fields associated with medicine, nutrition, toxicology, biology, chemistry, or other similar disciplines. The European Food Safety Authority provides the relevant panels for this purpose. If the scientific opinion is favourable, the Commission then proposes a draft legislative Decision to the Regulatory Committee composed of representatives of Member States for an opinion. If the Regulatory Committee gives a favourable opinion, the Commission adopts the Decision. If not, the draft Decision is submitted to the Council of Ministers for adoption or rejection by qualified majority. If the Council does not act within 3 months, the Commission shall adopt the decision. During the notification process, the public is also informed and has access to the publicly available data on the internet, for example the summary notification format, the assessment reports of the competent authorities or the opinion of the Scientific Panels. For experimental releases, notifications are examined and consent is granted as appropriate by the authorities of the Member State in which the release is to be conducted. Under the rules on the deliberate release of GMOs into the environment (Directive 2001/18/EC and previously Directive 90/220/EC) so far 18 GMOs have been approved for release into the environment, for different uses, some for cultivation, some for import and processing, some as feed, some as food. In terms of crops species, these GMOs include maize, oil seed rape, soybean and chicory<sup>46</sup>. About the discipline dictated by the Regulation 1829/2003 on genetically modified food and feed, it covers GMOs for food/feed use and includes all rules concerning food/feed containing or consisting of GMOs; food/feed produced from GMOs and food containing ingredients produced from GMOs referred to as GM food/feed. The Regulation stipulates that GM food/feed must not: have adverse effects on human health, animal health, or the environment; mislead the consumer; differ from the food/feed it is intended to replace to such an extent that its normal consumption would be nutritionally disadvantageous for the consumer/animals. The Regulation puts in place a streamlined and uniform EU procedure for all marketing applications, whether they concern the GMO itself or the food and feed products derived thereof. This means that business operators need not request separate authorisations for use of the GMO, and for its use in feed or in food, but that a single risk assessment and a single authorisation are given for a GMO and its possible uses. About the approval procedure, we have to recall that the Regulation is based on the “one door-one key” principle. Thus, it is possible to file a single application for obtaining both the authorisation for the deliberate release of a GMO into the environment, under the criteria laid down in Directive 2001/18/EC and the authorisation for use of this GMO in food and/or feed under the criteria laid down in Regulation 1829/2003. This authorisation, valid throughout the Community, is granted subject to a single risk assessment process under the responsibility of the European Food Safety Authority and a single risk management process involving the Commission and the Member States through a regulatory committee procedure. Applications are submitted first to the competent authority of the Member State where the product is first to be marketed. The application must clearly define the scope of the application, indicate which parts are confidential and must include a monitoring plan, a labelling proposal and a detection method for the new GM food or feed. The national authority must acknowledge receipt in writing within fourteen days and inform the European Food Safety Authority. The application and any supplementary information supplied by the applicant must be made available to EFSA which is responsible for the scientific risk

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<sup>46</sup> Twenty-four applications for the placing on the market of GMOs have been submitted into the authorisation procedure under Directive 2001/18/EC, while eleven of these applications have a scope which is restricted to import and processing, while the remaining ones also include cultivation as a requested use.

assessment covering both the environmental risk and human and animal health safety assessment. Its opinion is made available to the public and the public has the possibility to make comments. In general, a time limit of six months for the EFSA opinion is respected. This time limit can be extended if EFSA has to request further information from the applicant. Within three months of receiving the opinion of EFSA and on the basis of that opinion, the Commission drafts a proposal for granting or refusing authorisation; this proposal is approved through qualified majority of the Member States within the Standing Committee on the Food chain and Animal Health, composed of representatives of the Member States. If the Committee gives a favourable opinion, the Commission adopts the Decision; if not, the draft Decision is submitted to the Council of Ministers for adoption or rejection by qualified majority. If the Council does not act within three months, the Commission shall adopt the decision. Products authorised shall be entered into a public register of GM-food and feed. Authorisations is be granted for a period of ten years subject, where appropriate, to a post-market monitoring plan. Authorisations are renewable for ten-year periods<sup>47</sup>. About the rules on genetically modified seeds, the Directive 98/95/EC, specifies that national authorities that have agreed to the use of a seed on their territory must notify this acceptance to the Commission. The Commission examines the information supplied by the Member State concerned and its compliance with the provisions of EU seeds legislation. If such is the case, the Commission includes the variety concerned in the "Common Catalogue of varieties of Agricultural Plant Species" which means the seed can be marketed throughout the EU. The seed legislation furthermore requires that GMO seed varieties have to be authorised in accordance with Directive 2001/18/EC before they are included in the Common Catalogue and marketed in the EU. If the seed is intended for use in food, it also has to be authorised in accordance with the GM Food and Feed Regulation Genetically modified seed varieties must be labelled, in accordance with Council Directive 98/95/EEC. The label has to show clearly that it is a GM variety. Legislation on the marketing of forestry reproductive material also requires prior authorisation of GM material in line with the requirements of Directive 2001/18/EC. EU rules governing the marketing of vine material in line with Directive 2001/18/EC have also been adopted. Further rules on growing conditions and other requirements for purity concerning the presence of GM seeds in seed lots of traditional varieties, as well as detailed labelling rules are to be proposed shortly. Another important problem related to GMOs is the labelling and traceability of GMOs. Traceability provides the means to trace products containing or produced from GMOs through the production and distribution chains. The general objectives are to facilitate: control and verification of labelling claims; targeted monitoring of potential effects on the environment, where appropriate; withdrawal of products that contain or consist of GMOs should an unforeseen risk to human health or the environment be established. In particular, under the rules of Regulation 1830/2003 on labelling and traceability, business operators must transmit and retain information about products that contain or are produced from GMOs at each stage of the placing on the market<sup>48</sup>. In practice, traceability can be

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<sup>47</sup> Products from sixteen GMOs have been approved for use in food products and, consequently, can legally be marketed in the EU. These are: one GM soy and one GM maize approved under Directive 90/220/EEC prior to the entering into force of the Novel Food Regulation; processed foods derived from *inter alia* seven GM oilseed rape, 4 GM maize and oil from two GM cottonseeds. These products have all been notified as substantially equivalent in accordance with the Novel Food Regulation. Nine GM foods are currently pending at different stages in the authorisation procedure, including products from GM maize, sugar beet and soy bean.

<sup>48</sup> In particular, the requirements are that: operators shall have systems and procedures in place to identify to whom and from whom products are made available; for GMOs intended for deliberate release into the environment, operators must transmit specified information on the identity of the individual GMO(s) a product contains; for GMOs intended for food, feed or for processing, business operators may either transmit the specified information mentioned above or transmit a declaration that the product shall only be used as food or feed or for processing, together with the identity of the GMO(s) that 'have been used' to constitute the original mixture from which the

defined as the ability to trace products through the production and distribution line. For example, where production starts with a genetically modified seed, the company selling the seed would have to inform any purchaser that it is genetically modified, together with more specified information allowing the specific GMO to be precisely identified. The company is also obliged to keep a register of business operators who have bought the seed. Equally the farmer would have to inform any purchaser of the harvest that it is genetically modified and keep a register of operators to whom he has made the harvest available. The Regulation covers all GMOs that have received EU authorisation for the placing on the market, that is all products, including food and feed, containing or consisting of GMOs. Examples are seeds, which have been genetically modified and bulk quantities or shipments of whole GM grain e.g. soybean and maize. The Regulation also covers food and feed that are derived from a GMO. This includes tomato paste and ketchup produced from a GM tomato or starch, oil or flour produced from a GM maize. The other important issue related to GMOs is the one of the rules on labelling of GMO products. At this regard, Regulation 1831/2003 on labelling and traceability provides for comprehensive information by labelling all food and feed containing, consisting of or produced from a GMO. All food, including soya or maize oil produced from GM soya and maize, and food ingredients, such as biscuits with maize oil produced from GM maize must be labelled. The label has to indicate "This product contains genetically modified organisms" or "produced from genetically modified (name of organism)". The purpose is to inform consumers and farmers about the exact nature and characteristics of the food or feed, so that they can make informed choices. The same rules apply to animal feed including any compound feed that contains GM soya. Corn gluten feed produced from GM maize must also be labelled. This is to give livestock farmers accurate information on the composition and properties of feed. Minute traces of GMOs in conventional food and feed could arise during cultivation, harvest, transport and processing. In the production of food, feed and seed, it is almost impossible to achieve products that are 100% pure. With this background, in order to ensure legal certainty thresholds have been established above which conventional food and feed have to be labelled as consisting of or containing or being produced from a GMO. The presence of GM material in conventional food does not have to be labelled if it is below 0.9% and if it can be shown to be adventitious and technically unavoidable. A controversial aspect is that the EU Regulations allow the presence of traces of GM material which have received a favourable scientific assessment, but which are not yet formally approved. In fact, the adventitious or unintended presence of GM material in products placed on the market in the European Union is largely unavoidable and can occur during cultivation, handling, storage and transport. This situation already exists and affects products originating both in the EU and third countries. The Regulation acknowledges the fact that the production of food, feed and seed, it is practically impossible to achieve products that are 100% pure and, consequently, it defines the specific conditions under which a technically unavoidable presence of GMOs not yet formally authorised could be permitted. A number of GMOs have already been assessed by the Scientific Committees advising the European Commission as not posing a danger to environment and health, but their final approval is still pending. The Regulations allow the presence of these GMOs in a food or feed up to a maximum of 0.5% below which labelling and traceability will not be enforced. Above 0,5% it is prohibited to put the product on the market. This is on the basis that the presence of such material is adventitious or technically unavoidable and has been subject to a scientific risk assessment by the relevant Scientific Committees or European Food Safety Authority, which has concluded that the material does not present a risk for

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product arose; for food and feed produced from GMO(s) operators shall inform the next operator in the chain that the product is produced from GMO(s); operators shall retain the information for a period of 5 years and make it available to competent authorities on demand.

human health and the environment. The Regulation limits the application of this threshold to three years and provides that a detection method must be publicly available. This exemption aims to solve the problem faced by operators who have tried to avoid GMOs, but find that their products contain a low percentage of GM material due to accidental or technically unavoidable contamination. Another essential theme is the one of the co-existence of various farming practices, ruled by EU Law. The cultivation of GM crops will logically have implications for the organisation of agricultural productions. Pollen flow between adjacent fields is a natural phenomenon and there will be some pollen flow from GM crops to conventional crops and vice versa. Because of the labelling requirements for GM food and feed, this may have economic implications for farmers who want to produce non-labelled food or feed products. Coexistence is about giving farmers the practical choice between conventional, organic and GM crop production in compliance with the legal obligations for labelling and purity standards. On 5 March 2003, the Commission agreed that it should be up to the Member States to develop and implement management measures concerning co-existence, in accordance with the subsidiarity principle. On 27 July 2003 the Commission adopted a Commission recommendation (2003/556/EC) on co-existence setting out guidelines for the development of national strategies and best practices to ensure co-existence. The guidelines state that approaches to co-existence need to be developed in a transparent way, based on scientific evidence and in co-operation with all stakeholders concerned. The guidelines are based on experiences with existing segregation practices (e.g. in certified seed production); at the same time they ensure an equitable balance between the interests of farmers of all production types. Further, they state that management measures to ensure co-existence should be efficient and cost-effective, without going beyond what is necessary to comply with EU threshold levels for GMO labelling. They should be specific to different types of crop, since the probability of admixture varies greatly from one crop to another; while for some crops the probability is high (e.g. oil seed rape) for others the probability is fairly low (e.g. potatoes). In addition, local and regional aspects should be fully taken into account. Farmers should be able to choose the production type they prefer, without imposing the necessity to change already-established patterns in the neighbourhood. As a general principle, during the phase of introduction of a new production type in a region, farmers who introduce the new production type should bear the responsibility of implementing the actions necessary to limit admixture<sup>49</sup>. Continuous monitoring and evaluation and the timely sharing of best practices are indicated as imperatives for improving measures over time. After having briefly traced a legal framework of the EU norms in the field of genetically modified organism, let us now analyse the controversial aspects of its application that have emerged in the case-law at the EU level.

### **3. THE EU CASE LAW ON GMOS**

At the beginning of this essay we said that the major cause of the confrontation on biotechnologies - and their environmental impact - between EU member States and European Commission in front of the Court of Justice of the European Union is the attempt of the States to carve out for themselves spaces of autonomy with respect to the rules laid down by the Community legislation in the field of GMOs. We have to precise that this has occurred both with regard the cultivating and the placing on the market of GMOs, and basically in two

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<sup>49</sup> It should be noted that, under the Commission recommendation, priority should be given to farm-level management measures and to measures aimed at co-ordination between neighbouring farms. If it can be demonstrated that these measures cannot ensure co-existence, regional measures could be considered (e.g. restriction on the cultivation of a certain type of GMO in a region). Such measures should apply only to specific crops whose cultivation would be incompatible with ensuring co-existence in the region, and their geographical scale should be limited as possible. Region-wide measures should be justified for each crop and type (e.g. seed and crop production separately).

ways. First, through the use that the EU member States have made of the safeguard clauses and emergency measures established by the European Union law. Secondly, through the attempt, accomplished at the national level, to extend the margins of discretion accorded to the States in the context of the administrative procedures laid down by the EU rules on the placing on the market of GMOs. With regard to the first profile, it should be remembered that safeguard clauses and emergency measures are set forth both at primary and secondary law level of the European Union. In essence, the relevant provisions, although with slight differences in formulation, permit the Member State to temporarily restrict or prohibit the use or marketing of GMOs on its territory if, on the basis of new or additional information concerning the assessment of environmental risks or on the basis of a new assessment of the existing information, based on new or additional scientific knowledge, that State has reason to believe that a GMO poses a risk to human health or to the environment. With reference to the second mentioned profile, i.e. the margin of discretion that Member States have tried to reserve to themselves in the context of the administrative procedures laid down by the EU law on GMOs, two procedures are relevant. In particular: the procedure for placing on the market of GMOs, originally provided for by the Council Directive 90/220; the simplified procedure for the placing on the market of certain novel foods and food ingredients, laid down in the Regulation (EC) No. 258/97. These procedures were the subject of two important judgments of the Court of Justice, the *Greenpeace* judgment of March 21, 2000 (case C-6/99) and the *Monsanto* judgment of September 9, 2003, which will now be recalled in their essential parts. It is important to underline that both judgments are part of the Community administrative dispute and that they have not fully addressed the question of the effects of GMOs on the environment and human health. In the *Greenpeace* case, the Court of Justice had been asked to give a ruling on a question referred by the French *Conseil d'État* in the proceedings pending before it between the *Association Greenpeace France* and the *Ministère de l'Agriculture et de la Pêche*. The case concerned the placing on the market of genetically modified maize (*Zea mays* L.) with the combined modification for insecticidal properties conferred by the Bt-endotoxin gene and increased tolerance to the herbicide glufosinate ammonium pursuant to Council Directive 90/220. The placing on the market of this variety of maize had been authorized by the European Commission by decision no. 97/98 (23 January 1997). Following Decision 97/98, the French Minister for Agriculture, Fisheries and Food adopted, on 4 February 1997, a decree authorising the placing on the market of a genetically modified maize (*ZEA mays* L.) which constitutes the "consent in writing" provided for in Article 13 of Directive 90/220. On 5 February 1998, the same minister adopted a decree modifying the official list of plant species and varieties grown in France (maize seeds), in order to authorise the marketing of seeds of certain varieties of genetically modified maize. *Greenpeace* applied to the *Conseil d'État* to have the decree of 5 February 1998 suspended or annulled. In particular, *Greenpeace* claimed that the decree was unlawful on the ground that the administrative procedure followed by the French authorities before the dossier was forwarded to the Commission was irregular. In fact, for *Greenpeace*, the decree had been adopted following an irregular procedure and it infringed the precautionary principle. In particular, *Greenpeace* contended that the opinion of the Committee for the Study of the Release of Products of Biomolecular Engineering had been delivered on the basis of a dossier that was incomplete, as it did not include information that would allow an assessment of the impact on public health of the ampicillin-resistant gene contained in the varieties of transgenic maize that were the subject of the application for authorisation at the placing into market. The action for annulment brought by *Greenpeace* against the decree was joined, on September 25 1998, by the *Conseil d'État*, that decided to stay proceedings and to refer two questions to the Court for a preliminary ruling. The first question concerned the correct interpretation of the Directive n. 90/220 relating to the placing on the market of products containing GMOs. In particular, the *Conseil d'état* asked if

the provisions of the Directive 90/220/EEC of 23 April 1990 must be interpreted as meaning that if, after an application to place a genetically modified organism on the market has been forwarded to the Commission of the European Communities, no Member State has raised an objection as provided for in Article 13(2) of Directive 90/220, or if the Commission of the European Communities has taken a “favourable decision” pursuant to Article 13(4), the competent authority which forwarded the application to the Commission with a favourable opinion is obliged to give the “consent in writing” allowing the product to be placed on the market, or does that authority retain a discretion not to give such consent. The Court of Justice concluded that, given the wording of Article 13(4) of the Directive 90/220, the Member State is obliged to give its consent in writing so as to allow the marketing of the product when the Commission has taken a favourable decision. For the Court, in fact, the procedure for authorising the placing on the market of a product containing GMOs, envisaged in Directive 90/220, comes into operation only at the end of a procedure during which the national authorities have adopted a favourable opinion on the basis of the examination provided for in Article 12(1) of the directive and have thus had the opportunity to fully exercise their own powers to assess the risks which the release of products containing GMOs entails for human health and the environment. The right to deny its consent in writing was to be recognized, to the Member State concerned, only if, in the meantime, it has new information which leads it to consider that the product for which notification has been received may constitute a risk to human health and the environment. By the second question, the *Conseil d'État* asked whether the Commission's “favourable decision” obliges the competent national authority to give its “consent in writing”, notwithstanding any irregularities which might be found by a court in the conduct of the examination of the notification by that authority and which are such as to call in question the legality of the decision to forward the dossier with a favourable opinion to the Commission. In that regard, the Court pointed out that such an obligation presupposes, pursuant to Article 12(2)(a) of Directive 90/220, that the competent national authority has forwarded the dossier to the Commission with a favourable opinion and has thus initiated the Community phase of the procedure for authorising the product concerned to be placed on the market. Thus, that decision of the competent authority is the prerequisite for the Community procedure and, in the absence of any indication to the contrary from another Member State within the period laid down in Article 13(2) of the directive, may even determine its outcome. Furthermore, according to the Court of Justice, since it was an act adopted by a national authority, it was for the national courts to rule on the regularity of the examination of the notification referred to in Article 12, n. (1) of Directive No. 90/220. Indeed, where the national court finds that, owing to irregularities in the conduct of the examination of the notification by the competent national authority (provided for in Article 12(1) of Directive 90/220) was not proper for that authority to forward the dossier with a favourable opinion to the Commission, that court must refer the matter to the Court of Justice for a preliminary ruling if it considers that those irregularities could affect the validity of the Commission's favourable decision. If necessary, the national court can also order the suspension of application of the measures for implementing that decision until the Court of Justice has ruled on the question of validity. The analysis of the *Greenpeace* judgment shows that the Court of Justice has considered the procedure for the placing on the market of GMOs, covered by Directive No. 90/220, fully capable of guaranteeing to the Member States a margin of discretion both at the time of the initial decision on the notification by the competent national authority and at the later and potential stage of the finding of irregularities in the procedure for examining the notification by the Commission. In the latter case, the national court which has found any irregularities in the examination of the application for placing on the market, which could affect the legality of the transmission of the dossier to the Commission in a favourable opinion, may be brought before the Court of Justice. The Court, if the procedural irregularity found at national level

could be established, may annul the Community decision determining the national consensus. Going to examine the *Monsanto* judgment of the Court of Justice of 9 September 2003 (Case C-236/01), it should first be noted that the company in question had contested, before the Administrative regional tribunal (TAR) of Lazio, the Decree of the President of the Council of Ministers of 4 August 2000 on the precautionary suspension of the trade in and use of certain transgenic products within national territory. This Decree had been adopted under the safeguard clause laid down in article 12 of Regulation No 258/97 and it concerned foods products placed on the market on the basis of the simplified procedure laid down by that regulation. According to the Italian Government, the decision to suspend the marketing and the use of products deriving from genetically modified maize lines was based on the scientific advice provided by the competent national bodies, Harmlessness of the products in question, who had expressed doubts about the fact that the products in question were harmless. Moreover, according to the Italian authorities, the use of the simplified procedure resulted in an incomplete assessment of the risks arising from the placing on the market of the food product. By order of 18 April 2001, therefore, the TAR of Lazio considered that the decree of 4 August 2000 was fully legitimate and justified, raising doubts as to the legitimacy of the use of the simplified procedure. In fact, according to the TAR, the procedure in question did not allow an adequate assessment of the safety of ingredients and foods products resulting from GMOs. Moreover, the use of the simplified procedure, which was justified on the basis of rapidity and administrative simplification, would not have allowed full participation of the competent national authorities in the evaluation procedure concerned. On the basis of these considerations, the TAR had suspended the pending judgment and submitted to the Court of Justice some of the questions referred for a preliminary ruling, which essentially relied on the interpretation and validity of the provisions of Regulation No. 258/97 concerning the simplified procedure for the placing on the Community market of novel foods, i.e. those foods produced from GMOs but which do not contain them (art. 3, 4, par. 1 and 5, par. 1; art. 12, Regulation n. 258/97). It should be recalled that the premise for the application of this procedure, which required the European Commission to notify the new foods to be placed on the market, was to ascertain the "substantial equivalence" of new foods products with traditional ones, made by the competent national bodies. While answering at the questions, the Court of Justice of the European Union has first of all specified that the first subparagraph of Article 3(4) of Regulation No 258/97 must be interpreted as meaning that the mere presence in novel foods of residues of transgenic protein at certain levels does not preclude those foods from being considered substantially equivalent to existing foods and, consequently, use of the simplified procedure for placing those novel foods on the market. However, that is not the case where the existence of a risk of potentially dangerous effects on human health can be identified on the basis of the scientific knowledge available at the time of the initial assessment. It is for the national court to determine whether that condition is satisfied. Moreover, the Court of Justice ruled on the legitimacy of the Italian decree, saying that the safeguard clause must be understood as giving specific expression to the precautionary principle and, for this reason, it allows a State to take any consequential measures without waiting for the actuality and severity of the risks to be fully demonstrated (110 motivation). So, in principle, the issue of the validity of the use of the simplified procedure laid down in Article 5 of Regulation No 258/97 for the placing of novel foods on the market does not affect the power of the Member States to adopt measures falling under Article 12 of that regulation, such as the Decree of 4 August 2000 at issue in the main proceedings (114 mot). Nevertheless, those measures can be adopted only if the Member State has first carried out a risk assessment which is as complete as possible given the particular circumstances of the individual case, from which it is apparent that, in the light of the precautionary principle, the implementation of such measures is necessary in order to ensure that novel foods do not present danger for the

consumer, in accordance with the first indent of Article 3(1) of Regulation No 258/97. It is easy to point out that the *Monsanto* case concerned the legislation of a State prohibiting the placing on the market and the use (but not the cultivation) of GMOs on the national territory. In the same direction can be read the following judgments of the Court of Justice which have ruled similar prohibitions imposed by other States, as in the case of Austrian rules which were the subject of a judgment of the Court of First Instance of 5 October 2005 and a judgment of the Court of Justice of 13 September 2007. As for the Austrian case, it should be remembered that, in 2002, the province of Upper Austria (*Land Oberösterreich*) had prepared a draft law to prohibit the cultivation of seed and planting material containing or consisting of GMOs, as well as the reproduction and release into the environment of transgenic animals for hunting and fishing purposes (*Oberösterreichisches Gentechnik-Verbotsgesetz*). On 13 March 2003, the Republic of Austria notified the Commission of the abovementioned draft law, in order to obtain a derogation from the provisions of Directive 2001/18/EC, on the basis of the safeguard clause provided by the art. 95, para. 5, of the TCE. By decision of 2 September 2003, the Commission rejected the application submitted by the Republic of Austria, claiming that it had not provided any new scientific evidence on specific problems which had arisen in the Land Oberösterreich since the adoption of Directive No. 2001/18/EC, justifying the derogation required. In response to the Commission's decision, the Land Oberösterreich and the Republic of Austria brought an action before the Court of First Instance, which has decided the case with the judgment of 5 October 2005. In particular, the applicants argued that the Commission should have accepted the application by the Republic of Austria because the measure notified was aimed at the protection of the environment, was based on new scientific evidence and was justified by a specific problem of Austria and complied with the principle of proportionality. However, in the view of the Court of First Instance, the *Land Oberösterreich* and the Republic of Austria did not produce sufficient evidence to show that the territory of Upper Austria contained particular or exceptional ecosystems such as to require a proper risk assessment, distinct from that made for Austria as a whole or for other comparable European regions. Consequently, in the light of those considerations, the Court of First Instance dismissed the action brought by the *Land Oberösterreich* and the Republic of Austria against the Commission's decision. The Court of First Instance's judgment was challenged by the applicants, which applied for the annulment before the Court of Justice. In support of the appeals, the *Land Oberösterreich* and the Republic of Austria claimed the violation of art. 95, para. 5 of the TEC, underlining, in particular, the centrality of the element of new scientific evidence for the adoption of safeguard measures. With the judgment of 13 September 2007 in the case of *Austria c. European Commission*, the Court of Justice confirmed the judgment of the Court of First Instance and dismissed the applications. In particular, the Court of Justice noted that the legitimacy of the national measures notified pursuant to art. 95, para. 5, TEC, is closely linked to the assessment of the scientific evidence submitted by the notifying Member State. In this regard, the Commission's decision was based on the opinion of the European Food Safety Authority of 4 July 2003, in which it was found that there was no scientific evidence showing the existence of a specific problem or any scientific evidence of a special or exceptional ecosystems that would require a risk assessment distinct from those conducted for Austria as a whole or for other similar European regions. According to the Court, therefore, the judgment of the Court of First Instance correctly reproduced the conclusions of the Commission and of the EFSA, while the Republic of Austria had not provided any scientific evidence to demonstrate, in particular, the existence of particular ecosystems or of a specific problem. After the *Land Oberösterreich* and *Austria c. Commission* judgments, the Court of Justice has again made its point on the problematic comparison between Member States and European Commission on GMOs. We have to recall, in particular, the judgments of 8 September 2011 and 6 September 2012. In the Judgment *Monsanto SAS et al. c.*

*Ministre de l'Agriculture et de la Pêche* of 8 September 2011, the Court of Justice helps to clarify some important issues relating to the use, by the Member States, of safeguard clauses and emergency measures provided for by Community legislation on GMOs. In particular, the Court states that a Member State cannot adopt any measure of suspension or prohibition of the use or placing on the market of a product, pursuant to article 23 of the Directive 2001/18/EC, with reference to GMOs (such as MON 810 maize, object of the Judgment) authorized as seed for cultivation under Directive No. 90/220. This if the same GMOs have been notified as existing products (under the conditions laid down in Article 20 of Regulation No 1829/2003) and subsequently submitted to a request for renewal of authorization still in progress. By virtue of these conditions, the national measures of suspension or provisional prohibition may be adopted only in accordance with Art. 34 of Regulation No. 1829/2003. With this judgment, the Court of Justice has also stated what is relevant to establish the existence of a situation which may, "manifestly", constitute a "serious risk" to human health, to the health of animals or to the environment, which is necessary for the adoption of the emergency measures referred to in art. 34 of Regulation 1829/2003. According to the Court, the meaning to be attributed to the expressions "manifestly" and "serious risk" is linked to the finding of a serious risk posing a threat to human, animal health, or environment, which "must be established on the basis of new elements based on reliable scientific data". The protection measures adopted on the basis of art. 34 of Regulation No. 1829/2003 cannot be validly motivated by a purely hypothetical risk approach based on simple assumptions not yet scientifically established. The condition for the adoption of emergency measures is that they are based on a comprehensive risk assessment as far as possible taking into account the specific circumstances of the particular case, demonstrating the need for such measures. In the further judgment of 6 September 2012 in the case of *Pioneer Hi Bred Italia Srl c. Ministero delle Politiche agricole alimentari e forestali* (the Italian Ministry of Agricultural and Food Policies), the Court of Justice had been asked to give a preliminary ruling on the interpretation of Article 26 *bis* of the Directive No. 2001/18/EC (which provides for the possibility for Member States to take all appropriate measures to avoid the unintentional presence of GMOs in other products), in the light of the Commission Recommendation of 23 July 2003 and of the subsequent Commission Recommendation 13 July 2010, which actually delegates the Member States to take measures to prevent the involuntary presence of genetically modified crops in conventional and organic crops. The question for preliminary ruling had been submitted by the Italian State Council in the context of the proceedings pending before it between Pioneer Hi Bred Italy Srl and the Ministry of Agriculture and Forestry Policies. It concerned the legitimacy of a note from the Ministry in which the Pioneer was informed of the impossibility to decide on its request for authorization to plant genetically modified maize hybrids (already entered in the Common Catalog of Varieties of Species Of agricultural plants), in the wake of the adoption by the Regions of rules to ensure the coexistence between conventional, biological and transgenic crops. The questions posed by the Council of State were aimed, in particular, to know whether, in the respect of the EU law, the cultivation of GMOs may be subject to national authorization and whether art. 26 *bis* of the Directive No. 2001/18/EC allows a Member State to oppose the cultivation of GMOs in its territory in the delay of the adoption of coexistence measures. Ruling on the issue, also with reference to the Italian provisions issued by the Legislative Decree n. 212 of 2001, the Court of Justice has stated that a Member State is not free to subject, at a national authorization based on considerations of health or the environment, the cultivation of GMOs authorized under Regulation No. 1829/2003 and registered in the common catalogue pursuant to the Directive 2002/53. On the contrary, a ban or a restriction on the cultivation of such products may be decided by a Member State in the cases expressly provided for by the European Union law. Among these possible exceptions there are, on the one hand, the measures taken pursuant to art. 34 of

Regulation No. 1829/2003 and, on the other hand, the coexistence measures taken under art. 26 *bis* of Directive No. 2001/18/EC. The Court concluded on the point that the cultivation of GMOs (such as varieties of maize MON 810, which is the subject of the proceeding) cannot be subject to a national authorization procedure when the use and marketing of such varieties are authorized under article 20 of Regulation No 1829/2003 and the same varieties were entered in the common catalogue provided for by Directive 2002/53. Moreover, the Court then held that the art. 26 *bis* of Directive No. 2001/18/EC does not allow a Member State to oppose in general the cultivation on its territory of such GMOs in the adoption of coexistence measures aimed at avoiding the accidental presence of GMOs in other crops. The orientation expressed on the interpretation given to Art. 26 *bis* of the Directive No. 2001/18/EC was confirmed by the Court of Justice in an Order of 8 May 2013 in the case *Fidenato*. The Court was referred by the Tribunal of Pordenone for a preliminary ruling under a criminal proceeding on behalf of the agricultural entrepreneur Fidenato. In this proceeding, Fidenato was accused of having cultivated in the spring of 2010 the variety of genetically modified maize MON 810 without obtaining the prior authorization required by national law pursuant to art. 1, paragraph 2 of Legislative Decree no. 212 of 2001. With reference to the authorization provided for by that provision, the Court has decided that European Union law must be interpreted in the sense that “the cultivation of GMOs such as MON 810 maize varieties cannot be subject to a national authorization procedure when the use and marketing of such varieties are authorized pursuant to article 20 of Regulation No 1829/2003 and the same varieties were registered in the common catalogue provided for by the Directive 2002/53”. The *affaire* of Fidenato who, after the court judgment reiterated the MON 810 corn seed in June 2013, has been the subject of further jurisprudential decisions such as the one of the TAR of Lazio in April 2014, and there are at present two case in progress at the Court of Justice. As mentioned before, there are two recent cases posed at the Court of Justice. As for the first one, with the Judgment of December 15th 2016 on the case *TestBioTech and Others v. Commission*, the Court has ruled on the legitimacy of the 2013 Decision of the European Commission authorising the placing on the market of products containing, consisting of, or produced from a genetically modified type of soybean. In this case, in line with its previous jurisprudence, the Court has dismissed the action of some German non-profit organisation for environmental protection for annulment of the mentioned 2013 Decision. The second case dates at October 2016, when the Court was asked to rule, by the French Council of State, whether new GMO techniques (concerning organisms obtained by mutagenesis) fall under the EU Directive on the deliberate release into the environment of genetically modified organisms (n. 2001/18/EC, on which we will return later). In fact, a doubt arose about the status of new mutagenesis techniques, which did not exist when the European Union regulated the release of genetically modified organisms. The new GMO techniques have been dubbed “new plant breeding techniques” (NPBTs) by their proponents, who hope to sidestep the stigma, regulations, and labelling requirements attached to GMOs. But in the view of qualified experts, the products of new plant breeding techniques are GMOs, both legally and scientifically. Given the strong doubts about this issues, the French Council of State has found ‘a serious difficulty in interpreting European Union law’ and asked the European Court of Justice whether NPBTs fall under EU GMO law, whether they should be classed as GM varieties in EU law and whether countries could ban NPBTs. The Council of state also asked the Court of Justice whether, were NPBTs to be exempt from EU GMO rules, this would endanger the precautionary principle. In deciding the matter in its Judgment of July 25th 2018 the Court, taking into account the health and environmental protection objectives which have inspired the European regulation on GMOs and the precautionary principle, has stated that the products resulting from these new techniques meet the European definition of GMOs. Consequently, they should be supervised in the same way by respecting the corresponding obligations in terms of pre-authorization assessment,

traceability, product labelling and monitoring. Only traditional mutagenesis techniques developed prior to the adoption of Directive 2001/18 on GMOs are excluded from its scope, as explicitly stated in the Directive<sup>50</sup>.

### 3. CONCLUSIONS

In conclusion, the judgments of the Court of Justice hereafter analysed have generally proceeded in the sense of a restrictive interpretation of the safeguard clauses and emergency measures provided for in the EU Directives in the form of GMOs and used by the Member States to limit the cultivation or placing on the markets of such products. It is often referred to as the precautionary principle, but to narrow its scope to cases where there are certain scientific evidences. What openly contradicts the precautionary principle itself, based on the idea that, when there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation. This confirms that, in an attempt to reconcile the different needs of general interest (such as public health on one side and, on the other side, economic and commercial needs), the European Community's action before, and the European Union's at a second time, has always consistently given priority to the positive repercussions of biotechnology and genetic engineering on Community industrial and commercial development. In this perspective, the persistent difficulties of "survival" of the precautionary principle, in the name of the need for technological progress for industrial and commercial purposes, seems to confirm the centrality attributed by the EU legislation and case law to the construction of the European single market and to the promotion of trade liberalization and free competition. But the safeguarding of public necessities other than the purely commercial ones would require a more radical change in the European Union's rules on GMOs, in order to reinforce the risk assessment procedure and to guarantee the right of the Member States to limit or prohibit the cultivation or placing on the market of GMOs in their territory, for reasons of environmental or health protection, even in a non-temporary way.

### LITERATURE

[1] Council Directive 2002/53/EC of 13 June 2002 on the common catalogue of varieties of agricultural plant species, in OJ L 193, 20.7.2002, p. 1–11.

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<sup>50</sup> In particular, the Court interpreted the aforementioned European legal framework in the sense that: «1. Article 2(2) of Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC must be interpreted as meaning that organisms obtained by means of techniques/methods of mutagenesis constitute genetically modified organisms within the meaning of that provision. Article 3(1) of Directive 2001/18, read in conjunction with point 1 of Annex I B to that directive and in the light of recital 17 thereof, must be interpreted as meaning that only organisms obtained by means of techniques/methods of mutagenesis which have conventionally been used in a number of applications and have a long safety record are excluded from the scope of that directive. Article 4(4) of Council Directive 2002/53/EC of 13 June 2002 on the common catalogue of varieties of agricultural plant species, as amended by Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003, must be interpreted as meaning that genetically modified varieties obtained by means of techniques/methods of mutagenesis which have conventionally been used in a number of applications and have a long safety record are exempt from the obligations laid down in that provision. Article 3(1) of Directive 2001/18, read in conjunction with point 1 of Annex I B to that directive, in so far as it excludes from the scope of that directive organisms obtained by means of techniques/methods of mutagenesis which have conventionally been used in a number of applications and have a long safety record, must be interpreted as meaning that it does not have the effect of denying Member States the option of subjecting such organisms, in compliance with EU law, in particular with the rules on the free movement of goods set out in Articles 34 to 36 TFEU, to the obligations laid down in that directive or to other obligations» (conclusions of the Court).

- [2] G. NICOLINI, *Immissione in commercio del prodotto agro-alimentare. Regole comunitarie e competenze dell'Autorità europea per la sicurezza alimentare. Gli alimenti e i mangimi geneticamente modificati*, Torino, 2005.
- [3] F. CAPPELLI-B. KLAUS-V. SILANO, *Nuova disciplina del settore alimentare e autorità europea per la sicurezza alimentare*, Milano, 2006.
- [4] Judgment of the General Court of 14 March 2018, Case T-33/16, *TestBioTech eV v. European Commission*, published in the electronic *Reports of Cases*.
- [5] Judgment of the General Court of 15 December 2016, Case T-177/13, *TestBioTech eV and Others v. European Commission*, published in the electronic *Reports of Cases*.
- [6] Order of the Court of 8 May 2013, *Procura della Repubblica v Fidenato Giorgio*, Case C-542/12, published in the electronic *Reports of Cases*.
- [7] T. BABUSCIO, *Analisi di problemi giuridici nei sistemi amministrativi delle autorità per la sicurezza alimentare europee e statunitensi*, Milano, 2005.
- [8] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety, in OJ L 31, 1.2.2002, p. 1–24.
- [9] Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed, in OJ L 268, 18.10.2003, p. 1–23.

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