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CLASSIFICATION OF EMERGENCY SITUATIONS

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Abstract: There is no universally accepted definition or classification of an emergency situation. Adoption of a universally and generally acceptable classification of emergency situations represents one of the important challenges the researchers, competent governmental authorities, and international organizations have to face.

The classification of emergencies in this paper has been made on the basis of analyses of different sources, such as course books, articles, internet sites, relevant international and national reports, etc. Based on this, several criteria have been proposed for defining classification of emergencies. Justification and acceptability of classification of emergency situations constitute an important prerequisite for their valid recording and better quality analysis, as well as for the international cooperation of governments, authorities in charge, members of the scientific community and non-governmental organizations from that field of work. This paper gives a short overview of the classification of emergency situations, with a special focus on the USA, the Russian Federation, China, the Netherlands, Germany and Serbia.

Key words: *emergency situations, concept, classification, criteria, members.*

INTRODUCTION

The classification is not only important for science, but it is also one of the basic components of the common sense thinking. It is used in the process that goes from identification[1] to comparison, as a logical action. In order to be feasible, the classification needs to be supported by a derived description of the subject of consideration, i.e. of the research.

The researches that have been conducted so far, being predominantly focused on the classification of emergencies, are very rare. Moreover, scientific endeavours tackling description and explanation of certain subjects of research concerning emergencies or the research as a whole, where these researches partly relate to the classification of emergencies, are far more present. It means that classifications of emergencies, partly or as a whole, are present, but only as side contents of descriptive and explanatory researches in the field of emergency issues. At the same time, it is a part of research relating to the emergencies that is most often implemented on a low-profile basis. This can be argumented by the absence of the analysis of derived classifications of emergencies from the aspect of their validity. As a consequence, there is a confusion in the meaning of certain terms that are of importance for the understanding of the concept of emergency situations, their main attributes, their transformation into criteria (division principles), as the contents of classification, i.e. members of these classifications relating to certain types of emergencies. The mentioned facts indicate the necessity of researching the classification of emergency situations, to which this paper has been actually dedicated.

All the classifications, including the one relating to emergencies, consist of *three constituents:* subject of division, criteria and members. It should be however noted that requirements concerning the validity of classification represent the theoretical and logical conditions that should be met by the classification so that it could be classified as a scientific classification. Therefore, given the abovementioned, the subject of research of classification of emergencies refers to the following: 1) defining the emergencies, 2) examining validity of selection criteria and 3) members of the division of emergencies, in relation to the requirements of classification validity.[2]

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1 «Identification and transfer of important features or characteristics of a certain category of objects or events. This actually indicates the statement that a descriptive research has elements of a classifying nature"(Fitzgerald J.D, Fox M.S: *"Methodology of Research in Criminal Sciences"*, translated from English by: Bakic I, Muratbegovic E, Faculty of Criminal Sciences, Sarajevo, 2001, p. 269.).

2 In principle, researches of classifying contents should contain three parts: (1) theory determination of the subject of division, (2) identification of the division criteria and (3) identification of the members of division (Субошић, Д: *Researches of classifying contents in the field of safety*, Vojno delo, No 1 (2009), pp. 227-241.

In order to make a classification (typology) of all the subjects of division, and of emergencies, too, researches of the classifying contents should be prepared, organized and implemented. The objective of such researches is a valid classification (typology) of the subject of division. It means that classification of emergencies should be logical and theory based, but also beneficial. More precisely, derived classification should be made by a verification of hypothesis based on statements relating to the similarities and differences of criteria that have been used for the classification and of the members they contain. Moreover, the indicators of such hypotheses should align with the review of validity of criteria (historicity and structurality criteria) and of members (consistency, completeness, exhaustiveness, non-interference of members and discriminativity). Apart from the mentioned theory qualities, the classification should have a pragmatic-teleological qualities relating to its ability of practical implementation in terms of facilitating the undertaking of proactive measures for the prevention of occurrence of an emergency or measures for reaction, i.e. confrontation with already occurred emergencies. Also, the classification is useful if it allows for the implementation of the same or similar proactive or reactive measures in cases of same or similar types of emergencies. Finally, future classifications should be pragmatic in terms of manageability of the number of types of emergencies. Differences between them should be wide enough to ensure avoidance of classifications that have exclusively a scientific implementation, i.e. a theory importance.

DEFINITION OF EMERGENCY SITUATIONS

The research of the classifying contents begins with the theory determination of the subject of research, where the ultimate objective is to define the subject of division. This does not incur only from the need that researched terms should be unequivocally and validly determined from the aspect of their contents and scope, but also for the sake of the dialectical unity of definition and classification. Therefore, in the absence of a definition of the term that is subject to division, it will not be possible to apply the classification criteria for determining the types of such terms.[3]

The content of a term is determined by its unambiguous definition. It means that "What is being defined – is being classified". Namely, in order to validly define the term of emergency and in order to derive a valid classification on the basis of the incurred (adopted) definition, it is necessary to separate the term of emergency situation from the similar terms, such as: *disaster, catastrophe, emergency, hazard, adversity, accident, major incident.*

Main features used for defining a certain term are called attributes, among which the classification criteria are being identified. As a consequence, the classification will have the members that are the result of the subject of division determined by a definition and the accordingly applied criteria, i.e. the principle of division. Thus the classification of the same term that has been defined by various main features will contain different criteria by means of which it has been derived and consequently different members. This may mean that both hypothetical classifications that have been derived from different definitions of the term of emergency are valid, or not valid, as well as that one is more valid than the other, i.e. one can be valid according to certain requirements, and not valid according to other requirements, etc.

The definition of emergency that is mostly used in Serbia is the one of doctrinary type, contained in the *Law on Emergency Situations*, reading that "*The conditions in which risks and threats or consequences of catastrophes, extraordinary incidents and other hazards threatening the population, environment and material goods are of such a volume and intensity that their occurrence or consequences can not be prevented or eliminated by regular action from the part of authorities and services in charge, due to which it is necessary to deploy special measures, forces and means together with the enhanced work regime, in order to mitigate or eliminate them*".[4] In order to be of scientific importance, this definition, likewise all others, should be accurate (precise), adequate (corresponding to the term that it unambiguously determines), equivalent (equal to the scope of the term), not circular (does not define the term by the same term) and not negative (does not determine the term by what this term does not actually stand for, but by what it really means). The validity of the mentioned definition is tested by the following table.

3 Ibid.
4 *Law on Emergency Situations*, Official Gazette of RS, No. 111/2009, 92/2011 and 93/2012.

Table 1: The analysis of validity of definitions of emergency situations[5]

Features of a valid definition \ Definition	*The conditions in which risks and threats or consequences of catastrophes, extraordinary incidents and other hazards threatening the population, environment and material goods are of such a volume and intensity that their occurrence or consequences can not be prevented or eliminated by a regular action from the part of authorities and services in charge, due to which it is necessary to deploy special measures, forces and means together with the enhanced work regime, in order to mitigate or eliminate them.*	Validity statement
Accuracy	*... and other hazards...*	-/+
Adequacy	Intensity of hazards and intensity of engagement	+
Equivalence	Condition, hazards, consequences, protected values, measures, forces, means, work regime	+
Non-circularity	Term that is being defined (extraordinary situation) is not mentioned in the text of the definition	+
Non-negativity	*... their occurrence or consequences **can not** be prevented or eliminated by a regular action from the part of authorities and services in charge, due to which ...*[5]	-/+

The analysis of the mentioned definition of emergency situations shows that it is mostly valid theory-wise, whereas it is not its purpose. This is due to its doctrinary sense, i.e. the normative-legal character, given the fact that the legal, but not theory determination, is in question. The purpose of this analysis is in pointing out that the definition of the same term can be different and that can occur, for example, by removing its theory shortcomings. Thus the basic features of the term *emergency situation*, used for expressing its sense, would be somehow different, which would bring about the change of the classification criteria, and consequently the types of emergency situations.

The Russian and American doctrinary definitions of emergency situations belong to the group of more important definitions. The first reads as follows: "According to the *Law on Protecting the Population and Territories from Emergency Situations of Natural and Technogenic Character*, an emergency situation is understood to be the situation characterized by disruption of normal living and working conditions of people, endangerment of their lives and health, making damage to the property of the population, national industry and environment, as a result of the occurrence of causes of emergency situations in facilities, territories or aqua-territories".[6] On the other hand, according to the Manual of the American Federal Emergency Management Agency (FEMA), an emergency situation is defined as: «A non-planned situation that can provoke considerable injuries of employees, users or wider population and make damage to a great extent to the natural and material goods, as well as the possibility of having an impact on the company's reputation and deteriorating its financial condition."[7] By generalizing the mentioned features of emergency situations from the previous two definitions, one can notice their common characteristic. It refers to the „disruption of *normal* living and working conditions of people", but not to the intensity of hazards and response to them, as it is the case in the definition from the *Law on Emergency Situations* of the Republic of Serbia. However, one should bear in mind that the «disruption of normal living» is somehow culturally determined. For example, in the most developed countries, the «disruption of normal living»

5 It is the problem of assessing the adequacy of measures, particularity of forces, etc. which will be discussed in more details in the text below.

6 Федеральный закон РФ от 21.12.1994 N 68-ФЗ (ред. от 01.04.2012) „О защите населения и территорий от чрезвычайных ситуаций природного и техногеног характера".

7 Federal Emergency Management Agency, s Mitigation Directorate Fact Sheet, FEMA Website, www.fema.org.

can be a consequence of the absence of Internet, while the lack of water would be an example for the same in the poorest countries. So, the syntagm «disruption of normal living" is rather indefinite, and is no suitable for a definiens, i.e. for the term that is in the function of the unambiguous term of definiendum (the term that is being defined).

Apart from the precise and unambiguous determination of the term that is subject to division (in this case this is the emergency situation), this part of the work highlights the dialectical unity of the definition and classification (typologization)[8]. Thus the methodological statement has been accepted saying that imperfect definitions encourage the making of valid classifications (typologizations) and vice versa (imperfect classifications represent the cause of the more valid defining). Finally, an unambiguous determination of emergency situations brings about conditions for their classification.[9]

Quarantelli (1985, 2006) defines the disasters in the context of requirements and possibilities of the community to fight against the extreme incident and define it as a crisis opportunity where the requirements have exceeded the possibilities, offering the following division related to the intensity and resources of the community: 1. Crisis: Abilities (possibilities) exceed the needs, 2. Emergency situation: Abilities satisfy or exceed the needs to a certain extent, 3. Disasters: The needs exceed the abilities (possibilities), 4. A big disaster: The needs fight over (surpass) the abilities completely. Various influences of extreme natural events with various intensities are shown in the table 2.

Table 2 Comparison of event magnitude *(Source*: McEntire (2007), p. 3.)

	Crisis	Emergency/disaster	Calamity/catastrophe
Injuries	Many	Scores	Hundreds/thousands
Deaths	Many	Scores	Hundreds/thousands
Damage	Moderate	Major	Severe
Disruption	Moderate	Major	Severe
Geographic impact	Dispersed	Dispersed/diffuse	Diffuse
Availability of resources	Sufficient	Limited	Scarce
Number of responders	Many	Hundreds	Hundreds/thousands
Time to recover	Days/week	Months/years	Years/decades

IDENTIFYING CRITERIA FOR CLASSIFICATION OF EMERGENCY SITUATIONS

Identification of division criteria includes the questions of: (1) registering to-date classification criteria (typologizations) that refer to emergency situations and (2) comparison of classification criteria (typologization) for emergency situations according to the requirements relating to their validity. The examination of the proposed classification criteria are conducted in accordance with the methodological recommendations. They recommend in the first place that the classification should be made on the *historical-comparable basis.* This is in line with the application of the historical-comparative method and analysis of the contents (for the purpose of collecting data on the historical-geographic representation of certain criteria).[10]

By registering the existing criteria for classification of emergency situations, a suitable starting point is made for their mutual comparison, for the purpose of determining the most valid one. The mentioned comparisons are carried out in relation to the theory requirements concerning the validity of classifying. The objectives of these actions refer to the examination of validity of the existing divisions and selection of criteria that will be compared with the proposed principals of division of emergency situations.

8 Typologization is a type of classifying established by a simultaneous implementation of two and more criteria within the same subject of division. Therefore, the classification occurs by intercrossing elementary classifications (those classifications that were made by means of one criterion). As such, classification represents a more valid method of classifying than the elementary classifications, especially when complex subjects of divisions are in question.

9 Compare: Subošić, D: *Researches of classifying contents in the field of safety*, Military Journal, No 1 (2009), pp. 227-241.

10 *Ibid.*

A valid distribution of a subject to division is the one that satisfies the theory and logical requirements of the classification. Mentioned requirements belong to the ones that relate to the criteria (theory) and those relating to the members (logical) of divisions. The requirements concerning valid classification that relate to the criteria are historicity and structurality.[11] Thus the conditions for the analysis of validity of classification criteria of emergency situations deriving from the definition of emergency situations contained in the *Law on Emergency Situations* have been provided.

The analysis of the mentioned definition offers the conclusion that the next of kin is the "condition", and the typological difference: "the risks and threats or consequences of catastrophes, extraordinary incidents and other hazards threatening the population, environment and material goods are of such a volume and intensity that their occurrence or consequences can not be prevented or eliminated by a regular action from the part of authorities and services in charge, due to which it is necessary to deploy special measures, forces and means together with the enhanced work regime, in order to mitigate or eliminate them". By analyzing the typological difference, it can be concluded that "… hazards threatening the population, environment and material goods are of such a volume and intensity … deploy special measures, forces and means together with the enhanced work regime" constitute its essence. So, the intensity of hazards and intensity of deployment make the essence of the emergency situations, i.e. their main feature. This characteristic (intensity) of emergency situations exceeding the available response capacities is actually the attribute that is suitable for the transformation into a classification criterion.

Therefore, emergency situations per intensity criterion can be divided into emergency situations of low, medium and high intensity. Such a division is symmetrical to the division of conflicts, they being particular emergency situations per intensity (conflicts of low, medium and high intensity are well known). However, the problem of measuring the mentioned intensity becomes evident in the process of classifying emergencies, as well as the problem of its historicity (as it does not indicate the occurrence and development of emergency situations), and also of its structurality (as it does not indicate a substantial structural feature of emergency situations). Division of emergency situations that is derived from the intensity as a criterion of division of emergencies refers to the members such as: minimum, small, moderate, severe and catastrophic emergency situations.[12]

The intensity can be a classification criterion in emergency typologies. For example, emergency situations are classified by using intercrossing criteria (and classifications that result from their application) relating to the *penetration and intensity* in the typologies of the scientists from Russia [13] and the USA[14] (tables 3 and 4).

Table 3: Typology of emergency situations by using penetration and intensity criteria

Emergency situation penetration	Indicators and values of intensity of emergency situations			
	Number of casualties in emergency situations	Number of people with disrupted living and working conditions	Scope of material damage in relation to MCR*	Boundaries of the emergency situation zones
Local	Up to 10	Up to 100	1000 MCR at the most	Emergency situation zone does not stretch out of the borders of the object's territory

11 For further details see: Субошић, Д: *Researches of classifying contents in the field of safety*, Vojno delo, No 1 (2009), pp. 227-241.

12 *Guidelines concerning the methodology for the making of the assessment of hazards and protection and rescue plans in emergency situations,* "Official Gazette of RS", number 96/12.

13 Source: Основы защиты населения и территорий в кризисных ситуациях / Под общ. ред. Ю.Л. Воробьева. МЧС России. М.: Деловой экспресс, 2006.

14 Bimal Kanti Paul: *Environmental Hazards and Disasters: Contexts, Perspectives and Management* focuses; Publisher: Wiley; 1 edition (2011), 334 pages

Emergency situation penetration	Indicators and values of intensity of emergency situations			
	Number of casualties in emergency situations	Number of people with disrupted living and working conditions	Scope of material damage in relation to MCR*	Boundaries of the emergency situation zones
Municipal	10-50	100-300	Over 1000, but not more than 5000 MCR	Zone of the emergency situation does not stretch outside the municipality boundaries
Inter-municipal	10-50	100-300	Over 1000, but not more than 5000 MCR	Zone of the emergency situation encompasses 2 and more municipalities of one subject of the Russian Federation (RF)
Regional	50-500	300-500	Over 5000, but not more than 500000 MCR	Zone of the emergency situation does not stretch outside the boundaries of the RF subject
Inter-regional	50-500	500-1000	Over 500 000, but not more than 5 000 000 MCR	Zone of the emergency situation encompasses territories of 2 and more RF subjects
Federal	Over 500	Over 1000	Over 5 000 000 MCR	Zone of the emergency situation does not stretch outside RF boundaries
International	Zone of influence of negative factors exceeds the boundaries of the Russian Federation or an emergency situation occurred abroad and included the territory of the Russian Federation * MCR – minimum price of work			

Table 4: Classification of emergency situations by Gad-el-Hak (Paul, (2011)

Class	Number of persons killed/injured/displaced/affected	Area of impact (in square km)
Scope I (small disaster)	<10	<1
Scope II (medium disaster)	10–100	1–10
Scope III (large disaster)	100–1000	10–100
Scope IV (enormous disaster)	1000–104	100–1000
Scope VI (gargantuan disaster)	>104	>1000

However, emergency situations are most often classified according to the following types of criteria: 1. time (description: unexpected, speed of emergency development); 2. socio-environmental (description: human victims, epidemics, mass destruction of the cattle fund, reorientation of the production, use of the considerable quality of natural resources); 3. socio-economic (description:

big adversity, great hazard, causing the internal political instability, multitude of internal political events, increase of the inter-national tension, prominent international insecurity); 4. economic (description: substantial economic detriments and endangered financial and material resources, disruption of the regular traffic system, necessity of important material expenses and compensation and fund raising, necessity of using a large quantity of techniques for preventing situations and eliminating consequences); 5. organizational-managerial (description: unpredictable situations, complexity of the prognosis of the course of event and selection of solutions, necessity of securing big quantities of different expertise and organizations, unpredictability of the scale of evacuation and rescue services).[15] It can be concluded from the mentioned description of criteria that the intensity as a main feature of emergency situations is implicitly represented through the features such as: "the speed of emergency development, mass destruction of the cattle fund, use of the considerable quantity of natural resources, big adversity, great hazard, considerable economic detriments and disruption of financial and material resources, necessity of substantial material expenses and compensations and fund raising, necessity of using a large quantity of techniques for preventing situations and eliminating consequences, necessity of securing big quantities of various expertise and organizations", which is mentioned in the descriptive features of certain criteria.

Classification of emergency situations that has been derived on the basis of the intensity criterion is mainly of theory character, rather than of pragmatic-teleological (useful-targeted) character. It enables a classification of emergency situations in a way that satisfies theory requirements concerning validity of historicity and structurality of classification criteria, on one hand, and an appropriate intensity of engagement of protection and rescue forces depending on the intensity of the emergency situation, on the other hand. However, the intensity is not a sufficient criteria for the classification of emergency situations, as, for example, a 10 Richter's degree earthquake in an unsettled area is more intense than the eight degree earthquake in a (densely) populated area. It means that the consequence criterion should be added to the intensity criterion. This leads to a complex typology of emergency situations which represents a more valid classifying method of this complex subject of division.[16]

Purely pragmatic-teleological classification criteria and therefore the division of emergency situations as a whole include those divisions that have been derived from the criterion of penetration of the territory encompassed by the emergency situation. Such classifications include classifications that contain the members: local, municipal, regional, national, federal, inter-state and global – transnational[17], i.e. derived by the criterion of the size of the emergency situation: level I – object, facility; level II – object, facility, compound; level III – (level of the local self-government unit); level IV – national level; level V – international level.[18] Such classifications are similar to the classifications of documents, i.e. administrative acts as a whole, where their archiving, use, distribution, etc. have been made possible.

In order to be able to compare the existing and proposed classification criteria (typologization) of emergency situations, the historical-structural comparison framework must be previously determined. Considering the *historicity* as a unique approach and method of research, essential features of the occurrence and development of emergency situations have been provided. The synthesis of conclusions made by means of the research of historicity of emergency situations, makes possible the expression of various manifestations (reflections) of his generic features by using appropriate classification criteria (typologization). Thus the requirements of *historicity of selected criteria*, as the constituents of classification of emergency situations have been met.

A generic feature of emergency situations is the so called "hazard trigger", i.e. the *cause* which leads to the hazards and which is used as a criterion of their classification. Namely, the Center for Research on the Epidemiology of Disasters (CRED) has been striving for years for adoption of international definitions and classifications of emergency situations.[19] In 2006, by using analytical considerations of

15 Jakovljević, V: *The importance of the conflict against emergency situations,* International scientific meeting "Emergency situations", published in the Collection of works from the international scientific conference on civil planning, 28/29. January 2009; Organizer – Ministry of Defence – Belgrade: 2009, pp. 20-28.

16 Mentioned typology is given in the table No. 2 of this paper.

17 Чрезвычайных ситуациях, http://ru.wikipedia.org/wiki/:Чрезвычайных_ситуациях.

18 *Guidelines concerning the methodology for the making of the assessment of hazards and protection and rescue plans in emergency situations,* „Official Gazette of RS", number 96/12.

19 Center for Research on the Epidemiology of Disasters, The OFDA/CRED International Disasters Database, available at: www.cred.be/emdat/disdat2.htm (accessed January 2003).

defined and selected sets of data on natural emergency situations and their impact, the Center started a huge activity in the field of making conclusions on the international classification of emergency situations.[20] A great contribution and result in the area of international classification of emergency situations has been achieved in the mutual cooperation of this organization and the MÜNICHRE. As a result of their cooperation, the joint classification has been made and established through several technical meetings that gathered together the CRED, MünichRe (Münchener Rückversicherungs-Gesellschaft Aktiengesellschaft in München), SwissRe (Swiss Reinsurance Company), ADRC (Asian Disaster Reduction Center) and UNDP (United Nations Development Programme). This is at the same time the first step in the development of the standardized international classification of emergency situations. Standardized classification that has been made at the mentioned technical meetings distinguishes two different generic categories: natural (can not be caused by human beings) and technological emergency situations (can be caused by human beings, deliberately or accidentally). The same criterion is used for classification of emergency situations by the International federation of Red Cross and Red Crescent, as follows: hurricanes, tornadoes, typhoons, droughts, earthquakes, epidemics, food privation (famine), floods, man-made emergency situations, migrations of population, volcanic eruptions and technological catastrophes; World Health Organization (natural and technological)[21], Federal Emergency Management Agency (FEMA) – natural and technological[22]; Damon Coppola in his book *Introduction to International Disaster Mangment* – natural, technological and international, civil and political emergency situations – terrorism, crime and war[23]; Canadian database on emergency situations (available at the address www.ocipep.gc.ca/disaster/search.asp) – biological emergency situations, such as epidemics, geophysical, such as earthquakes, meteorological and hydrological, such as droughts, emergency situations caused by human conflicts, such as terrorism, technological emergency situations, such as outflow of chemical matters,[24] database on emergency situations (available at the address www.ocipep.gc.ca/disaster/search.asp) of the University of Richmond – emergency situations caused by conflicts, such as bombing, terrorist acts, emergency situations caused by failures of human systems, such as pulling down of damps, natural emergency situations, such as earthquake, Ibrahim Mohamed Shaluf – natural emergency situations caused by men and hybrid–combined emergency situations,[25] Hood – purely natural, social and hybrid emergency situations,[26] Richardson – socio-technological,[27] Malaysian National Safety Council;[28] in the Russian lecturing books (conflict and non-conflict),[29] Mikhail, Paenko and Suldin: technical-technological (technogenic); 2. natural and 3. environmental,[30] in the German bibliography: social, economic emergency situations, emergencies, technical – biological – medical emergency situations and emergency situations caused by the mechanical or thermal energy,[31] in the Chinese literature: astronomic, meteorological, geological, geophysical, hydrological, biological, environmental emergency situa-

20 The organization had a clear objective that consisted of the comprehensive overview of global initiatives following the formation of emergency databases, in order to record similarities and differences when defining and classifying emergency situations. All the states possess certain databases which contain records of various catastrophic events. The problem lies in the fact that national databases are different for the reason of classifying emergency situations into various categories. They occur due to different 1. terminology, and 2. classification. Thus, for example, in one national database, a certain emergency belongs to the natural disasters, while in the other national database, this emergency is classified in the category of social hazards.

21 World Health Organization: *Emergency and humanitarian action: natural disaster profile*, available at: www.who.int/disasters/.

22 Federal Emergency Management Agency: Hazards, available at: www.fema.gov/ hazards/earthquakes/.

23 Coppola, D: *Introduction to International Disaster Management*, Elsevier, Oxford, 2007, 130-140.

24 Kourosh, E, Richard, L: Disasters: lessons from the past 105 years, *Disaster Prevention and Management*, Vol. 17 Iss: 1, 2008, pp. 62 – 82.

25 Shaluf, M.: Disaster types, *Disaster Prevention and Management,* Vol. 16, Iss: 5, 2007, pp. 704-717.

26 Rautela, P: Redefining disaster: need for managing accidents as disasters, *Disaster Prevention and Management*, Vol. 15, Iss: 5, 2006, pp. 799-809.

27 Shaluf, M, Ahmadun, F.: Disasters types in Malaysia: an overview. Disaster Prevention and Management, Vol. 15, Iss: 2, 2006, pp.286-298.

28 Malaysian National Security Council. *Directive 20: policy and mechanism of national disaster management and relief*, available at: www.adrc.or.jp/nations/nationinformatioa asp?NationCode = 458&lang = (accessed January 2003).

29 Безопасность жизнедеятельности: Учебник для вузов, 2-е изд. / Под ред. Михайлова Л А. — СПб.: Питер, 2008.

30 Михалов, А.А., Паенко, Н.И., Сулдин, И., Классификация чрезвичайных ситуаций, в Проблемы безопасности при чрезвичайных ситуациях, ВИНИТИ, Москва, 1991, стр. 24-47.

31 Schenk, G.J; Engels, J. I. (Hrsg.): Historical Disaster Research. Concepts, Methods and Case Studies „Disaster"/ Historische Katastrophenforschung. Begriffe, Konzepte und Fallbeispiele. In: Historical Social Research/Historische Sozialforschung. 32, Nr. 3, 2007 (Sonderausgabe).

tions, fires, road accidents, explosions, emergency situations concerning collapsing-destruction of buildings, emergency situations at work stations, emergency situations in terms of health, emergency situations in the mines, scientific and technological emergency situations[32], in the Dutch literature: natural, anthropogenic, cultural and humanitarian,[33] and in the Republic of Serbia: natural disasters, technical-technological accidents – incidents, consequences of war activities and consequences of terrorist acts,[34] i.e.: earthquake, rockslide, landslide, erosion, flood, storm wind, blizzard, hail, drift, glaze, drought, epidemics, epizootia, fires and explosions, technical-technological incidents and terrorist attacks, nuclear or radiation accidents.[35]

Structurality of classification criteria (typologization) contributes to the selected division principle in such a way that it makes it an expression of an essential, structural feature of emergency situations. Therefore, the following question is asked: "Is the intensity of emergency situations a structural criterion of their division?" The intensity relates to the strength, i.e. energy that is developed within a time unit. This strength is rolled out depending on the structure, i.e. the processes (natural, technical or social, dependent or independent on people, caused deliberately or accidentally, etc.) that are going on within or in relation with this strength, having an emergency situation as a consequence.

On the other hand, among the criteria discussed so far, the structural principle of division is the one that is expressed as a time principle (the more energy is developed over a shorter period of time, the higher is intensity of an emergency situation and response), i.e. as an organizational-managerial principle. Namely, the rescue organization and its management have their own structure, both in the structuralist and post-structuralist sense.

As it has been just mentioned, the structure of the subject to division (in this case of emergency situations) can be considered from the post-structuralistic point of view, i.e. *as a process*. By analyzing the subject of division viewed as a process, a conclusion is made (conditionally, i.e. when possible) that its structure represents a range of technologically dependent phases. In other words, each phase of the mentioned process constitutes a unique structural feature and can be transformed into a criterion, i.e. a principle of division of emergency situations. For example, in relation to the predictability, emergency situations can be divided into situations that can and can not be predicted (emergency situations, their conditions, likelihood of occurrence of certain conditions, effects, and expectations, can or can not be predicted). According to the *conditions* in which they occur, they can be divided into those characterized by surety, risk and uncertainty.

One of the similar classifications of emergency situations is particularly important as it actually represents a complex typology. The mentioned typology has been derived by intercrossing criteria of 1) predictability and 2) possibility of impact on an emergency situation.[36] Both mentioned criteria are of historical-structural type, as they incur from the conditions of occurrence and development of an emergency, on one hand, and the possibility of the regulatory (managerial) influence on it, on the other hand.

Apart from the post-structural approach to the research of the structure of emergency situations, the implementation of a comparative approach is also possible. Namely, by comparing the structure of emergency situations with a similar structure, some other suitable principles of division can be singled out. Therefore, a comparative approach can lead to the same structure of emergency situations as it is the case of the post-structural approach. This is the case with already mentioned comparison of the types of emergency situations derived by means of the criteria of *condition* in which they occur.

After the mentioned recording and comparison of criteria for classification of emergency situations have been done, the same procedure is conducted with the related criteria of similar classifications (typologizations). Namely, similar objects of division have similar characteristics expressed by appropriate criteria for their classification. Division criteria are obtained by the transformation of attributes used for the expression of essential features of the subject of division.

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32 Coppola, D.: *Introduction to international disaster management*. Oxford: Elsevier, 2007., str 178.
33 Quarantelli, L.: *What is a Disaster*? New York: Routledge, 1998., str. 58 – 63/
34 Article 1, *Law on Emergency Situations*, "Official Gazette of RS", Number 111/09, 92/11 and 93/2012.
35 *Guidelines concerning the methodology for the making of the assessment of hazards and protection and rescue plans in emergency situations,* „Official Gazette of RS", number 96/12.
36 Kesetovic, Ž„: *Crisis management*: Official Gazette/Faculty of Security, Belgrade, 2008.

The essence of these features of emergency situations can be of quantitative, qualitative and quantitative-qualitative (mixed) nature. The features of the quantitative nature indicate the number (for example, division of emergency situations according to the number of casualties, the amount of material damage, etc.), frequency (most often – earthquakes, road accidents; very often – fires; hazards with a moderate frequency – accidents of communal systems, volcanoes; rarest – epidemics, large scale environmental accidents),[37] intensities (already mentioned), duration (for example, explosive and gradual)[38], i.e. short-term, mid-term and long-term or their permanent, occasional and temporary (single) manifestations and other features, are taken as criteria. Qualitative features indicate the quality, as the essential characteristic of emergency situations (types of consequences, for example, permanent consequences detrimental to lives and health of the population, material damage, damage to flora and fauna, and the environment as a whole). Qualitative-quantitative criteria represent the features of emergency situations that are used to denote their features where the quantity means quality at the same time, or turns into it (for example, when the intensity of an emergency situation is transferred into certain types of its consequences).

IDENTIFICATION OF MEMBERS OF EMERGENCY CLASSIFICATION

The third part of this work relates to the "identification of the members of division" of the classification of emergency situations where the validity of considered classifications is being checked in the domain of their members. Requirements relating to the validity of *members of division* are: consistency, completeness, exhaustiveness, non-interference and discriminativity.

This part of work generally deals with the following questions: 1) thesis, 2) antithesis, 3) synthesis, etc. The number of questions of this part of research relating to the classification of emergency situations depends on the number of division members (types of emergency situations), that can be a dichotomy (dichotomous – double)[39], trichotomy (trichotomous – triple), etc.

By identifying the first member of the division (for example, the one relating to the thesis), the hypothesis containing the statement about its similarities and differences with regard to the subject of division and other members of the classification of emergency situations is partly verified. Moreover, the member that is most often in question is the one relating to the natural emergency situations that occurred on the basis of the criterion of cause. Identification of the second member of classification relates to the antithesis, which is a naturally caused emergency situation in the case of previous classification. In this particular case, the synthesis relates to the combined, i.e. hybrid emergency situations.

In order to determine the indicators more precisely, it is possible to divide each member of the classification according to the consistency requirement, to other (sub)members, which leads to the creation of the *classification system* made of several levels of generality (in the relation: general – particular – individual). For example, according to Ibrahim Mohamed Shaluf, emergency situations can be classified as follows:

• Natural: *natural phenomena beneath the earth surface* (earthquake, tsunami, volcanic eruptions); *natural phenomena of the complex physical origin at the earth surface* (rockslides, avalanches), *meteorological-hydrological phenomena* (storms, cyclones, typhoons, hurricanes, tornadoes, hail and snow storms, sea bursts, floods, droughts, heat waves/cold waves) and *biological phenomena* (overruns – swarms of grasshoppers and bugs, epidemics or infectious diseases – cholera, dengue, Ebola, pox, meningitis, malaria, yellow fever, AIDS, SARS, bird flu);

• Man-made emergency situations: socio-technical emergency situations – *technological* (fire, poison release, collapse-destruction of buildings, material property), *explosions* (chemical, nuclear and mine munitions), *pollutions (*sour rains, chemical pollutions, atmospheric pollutions), *transport*

37 Чрезвычайных ситуациях, http://ru.wikipedia.org/wiki/:Чрезвычайных_ ситуациях.

38 *Безопасность жизнедеятельности . Защита населения и территорий в чрезвычайных ситуациях* : учебное пособие по дисциплине региональной составляющей специальности «Менеджмент организации» / [Я. Д. Вишняков и др.]. - 3-е изд., испр. - Москва : Академия, 2008. – 297с.

39 Shaluf. M. I: "Disaster types", Disaster Prevention and Management, Vol. 16, Iss: 5, 2007, pp. 704 -717.

related emergency situations (air, road, rail and emergency situations at the sea and internal navigable roads), *emergency situations at stadiums and public places* (fire, collapse of civil engineering, stampede of big groups of people), *production* (failure of computer systems, distribution of faulty goods), *wars* – conventional (war between two armies of different countries, riots, blockades), unconventional (nuclear, chemical, radiological and biological wars);

• Hybrid – combined (they are the result of the combination of human error and natural forces): floods that devastate a community located at the known navigable plain, location of settlements, factories, etc. at the foot of active volcanoes or in the areas of snow drifts.

By verifying each of the members of the classification of the system of emergency situations at lower levels of generality, conditions for verification of more general members (types of emergency situations) than those already verified are being provided. Therefore, the mentioned verification of hypotheses of the classifying contents, relating to the validity of concrete divisions, is implemented in an inductive way. Complete verification of such members (types) of classification of emergency situations occurs with the comparison in relation to the logical classifying requirements.[40]

The criterion used for the derivation of the thesis is also used for the derivation of antithesis. Apart from that, all that has been mentioned for the verification of the thesis relates to the verification of the antithesis, synthesis, etc. In order to do that, a proposed classification of emergency situations should be compared with the classification validity requirements, i.e. in relation to the: *consistency, completeness, exhaustiveness, non-interference of members and discriminativity.*

If the criterion of classification of emergency situations is the *cause* of their occurrence, then they are divided into natural, man-made and hybrid – combined emergency situations. Similar to this are the divisions containing: natural, technical and combined emergency situations, then: man-made emergency situations, occurred independently on people and combined; further on: natural, technological and international, civil and political emergency situations – terrorism, crime and war, i.e.: purely natural, social and hybrid and socio-technological, and finally: emergency situations caused by conflicts, emergency situations caused by the failures of human systems and natural disasters. Mentioned members of classification of emergency situations have been derived in a consistent manner, as each of them express the cause of their occurrence. All the classifications are complete as they contain the thesis, antithesis and synthesis, with the exception of the last one that does not contain the synthesis. Each of the mentioned classifications is exhaustive as it does not contain residual groups of members, such as: etc, and other. Mentioned classifications contain the members that do not interfere, i.e. are mutually exclusive. Finally, the members of the mentioned classifications are discriminative, i.e. they are theoretically mutually indented sufficiently enough to represent special types of emergency situations.

Classification of emergency situations used for the division of: biological, geophysical, meteorological and hydrological, emergency situations caused by human conflicts and technological emergency situations are also derived in a consistent manner, by using the criterion of cause. They are also complete as they basically contain the thesis – natural emergency situations (biological, geophysical, meteorological and hydrological), antithesis – emergency situations caused by the human action and synthesis – technological emergency situations (action of the natural and human factor).

The Malaysian national security council divides emergency situations into: natural, industrious, incidents that include: transport, supply and disposal of hazardous materials, collapse-destruction of multi-store buildings and special structures, plane crashes, crashes of trains and derailment, fire that encompasses a large area or high buildings or any other special structure with plenty of people inside, damage of power-plants or reservoirs, nuclear and radiological accidents that involve nuclear alloys or radioactive agents where the incident could extend and cause losses of human lives, damage to property or environmental pollution having an impact on local activities, release of the poisonous gas in a public area and mist-haze. This division has the elements of consistency in relation to the criterion of cause. However, its completeness is disputable as it does not contain all the modes of transport (only air and rail transports are present). The exhaustiveness of the classification has also been satisfied. Achieving the criteria of non-interference of members and discriminativity is not disputable either.

40 By using the feedback, deductive method, the conclusion regarding the validity of the members (types) of the most valid classification of emergency situations also relates to the domain of all the members that have been contained therein.

As it has been already indicated, the Russian learning books contain the division of emergency situations, they being conflict and non-conflict situations. This classification is dichotomous, as it contains the thesis and antithesis; it is consistent, complete, exhaustive, but has not an interference of the members and is discriminative.

A very important classification is of the same origin and relates to:

• The character of hazard – actually the cause of the emergency situation: technical, biological, natural, environmental and social character;

• The frequency rate (most often – earthquakes, transport accidents; very often – fires; hazards of medium frequency – accidents of communal systems, volcanoes; rarest: epidemics, large scale environmental accidents);

• Encompassed territory (local, municipal, regional, national, federal, inter-state and global – transnational).

The first classification is consistent, complete, exhaustive, but the members interfere and it is not discriminative. Namely, naturally caused emergency situations are the ones of environmental, i.e. biological character. The second classification (derived by means of the frequency rate) is consistent, incomplete, exhaustive, the members do not interfere and is discriminative. Namely, the division of emergency situations per frequency rate that contain the members such as: most often, very frequent; hazards with medium frequency and the rarest, lack rare emergency situations. Finally, according to the encompassed territory, a classification is derived and is constituent, complete, exhaustive, its members do not interfere and is discriminative.

The next classification, also of Russian origin, contains emergency situations that are divided into: technical-technological (technogenic); 2) natural and 3) environmental. All the members of the classification have been made by the implementation of the criterion of cause, which means that the classification is consistent. Also, it could be concluded that the classification is completely exhaustive. However, the interference of the members relating to the natural and environmental emergency situations is quite certain. This is at the same time the reason of its non-discriminativity. Such divisions can be precisely stated, by developing a classification system which would offer additional improvement in terms of non-interference of the members and their mutual discriminativity.[41]

Classification of emergency situations is present in the German literature and this classification contains the following types: social, economic emergency situations, emergency situations of technical-technological-biological-medical nature and emergency situations caused by the mechanical and thermal energy. This classification has been consistently and completely derived, however, likewise the previous classification, the interference of members and discriminativity have not been provided (social and economic emergency situations are mixed up, without being sufficiently theoretically indented). The recommendation concerning its improvement is identical to the one that relates to the previous classification.[42]

The Chinese literature avail of the division that relates to the: astronomic, meteorological, geological, geophysical, hydrological, biological emergency situations in the environment, fires, road accidents, explosions, emergency situations in relation to the collapse-destruction of buildings, emergency situations at work stations, emergency situations related to health issues, emergency situations in mines, scientific and technological emergency situations. This division of emergency situations has not been consistently derived, as all the members do not indicate the cause of the emergency situation, but only the location of its occurrence (emergency situations at work stations, i.e. emergency situations in mines). This classification is exhaustive as it does not contain residual groups. It contains the interference of the members (for example, emergency situations at work stations and emergency situations in mines, as the mine is the work place of miners, to which fires and explosions can be associated as well, as they can also occur at work stations and in mines). They are not discriminative, i.e. theoretically indented to a sufficient extent. Accordingly, this classification is not theoretically valid.[43]

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41 Безопасность жизнедеятельности . Защита населения и территорий в чрезвычайных ситуациях : учебное пособие по дисциплине региональной составляющей специальности “Менеджмент организации” / [Я. Д. Вишняков и др.]. - 3-е изд., испр. - Москва : Академия, 2008.

42 Gerrit Jasper Schenk, Jens Ivo Engels (Hrsg.): Historical Disaster Research. Concepts, Methods and Case Studies „Disaster“/Historische Katastrophenforschung. Begriffe, Konzepte und Fallbeispiele. In: Historical Social Research/ Historische Sozialforschung. 32, Nr. 3, 2007 (Sonderausgabe).

43 Downloaded from the internet address: http://zhidao.baidu.com/question/97098818.html
http://baike.baidu.com/picview/98783/98783/0/9213b07eca806538fa4fe39697dda144ac34828a.html,_

Classification of emergency situations is present in the Dutch literature and contains: natural, anthropogenic, cultural and humanitarian emergency situations. This classification has not been consistently derived as the cultural and humanitarian emergency situations are derived from the criterion of consequence, but not from the criterion of cause. The classification itself is not complete, as it has not been expressed by the thesis-antithesis-synthesis logic. Finally, the classification is exhaustive, but not immune to the interference of the members (anthropogenic, cultural and humanitarian members interfere), nor it is discriminative.[44]

The division of emergency situations in the Republic of Serbia relates to the nature of their occurrence: natural disasters, technical-technological accidents – incidents, consequences of war actions and consequences of terrorist acts,[45] i.e.: earthquakes, rockslides, landslides and erosions, floods, stormy winds, hail, blizzards, snow drifts and glaze, drought, epidemics, epizootia; fires and explosions, technical-technological accidents and terrorist attacks and nuclear or radiation accidents.[46] These classifications have been consistently derived; they are complete, exhaustive, provide no interference of members and are discriminative.

The division of emergency situations according to the size[47] is as follows: level I – object, facility; level II – object, facility, compound; level III – (level of the local self-government unit); level IV – national level; level V – international level. According to the consequences on people, animals, economy and environmental protection, socio-political situation, emergency situations are divided into[48]: minimum, small, medium, severe, catastrophic. Likewise previous divisions, the abovementioned divisions of emergency situations have been consistently derived and they are complete, exhaustive, provide no interference of the members and are discriminative.

Apart from the classifications of doctrinary type that are prescribed in the law and by-laws of the Republic of Serbia, classifications of emergency situations in theoretical literature are also present. One of them is of particular interest as it actually represents a complex typology of emergency situations. The typology in question has been derived by the intercrossing of predictability criteria and possibility of influence on an emergency situation (the following table).

Table 3: Complex typology of emergency situations

		Possibility of influence on an emergency situation	
		Manageable	Non-manageable
Predictability	Predictable	Conventional emergency situation	Non-manageable emergency situation
	Unpredictable	Unexpected emergency situation	Fundamental emergency situation

In that sense, the following types of emergency situations are distinguished:[49]

• Conventional emergency situations (they are predictable and possibilities of influencing them are well known),

• Unexpected emergency situation (characterized by the possibility to have an influence on them, though being hardly predictable),

• Non-manageable emergency situation (they can be predicted successfully, but the influence on them is already impossible due to the characteristics of the system in question, which makes the re-

44 Downloaded from the internet address:http://nl.wikipedia.org/wiki/Ramp – the Netherlands
45 Article 1 of the *Law on Emergency Situations*, "Official Gazette of RS", No 111/09 and 92/11 and 93/2012.
46 *Guidelines concerning the methodology for the making of the assessment of hazards and protection and rescue plans in emergency situations,* "Official Gazette of RS", number 96/12.
47 Ibid.
48 Ibid.
49 Kesetovic, Z: Crisis management: Official Gazette/Faculty of Security, Belgrade, 2008.

sponse difficult, as well as the preparedness for the emergency situation; or due to the conflict of interests surrounding the system that prevents the implementation of proactive countermeasures and

• Fundamental emergency situation (represents the most dangerous type of extraordinary situations because they are unpredictable and it is not possible or hardly possible to have an influence of them).

Mentioned typology of emergency situations has been consistently derived and it is complete, exhaustive, provides no interference of the members and is discriminative.

CONCLUSION

The prerequisite for the classification of emergency situations is an unequivocal determination of the mentioned subject of division. A newly created or analyzed classification of emergency situations should satisfy the conditions of the valid classification relating to the theory and logical requirements. According to this, validity requirements for classification relate to the criteria, on one hand, and to the members of division, on the other hand.

Theoretical research of the *classification of emergency situations* that has been performed by the analysis of various specialized materials published in Serbia and around the world represents an attempt of a modest contribution to the identification of the universally accepted classification of emergency situations. More concretely, during the research, a large number of various definitions and classifications of emergency situations has been processed, despite the authors' being aware that some of the translations have not been done in the most professional way, in an appropriate context, etc. Therefore, we are of the opinion that it will be worth elaborating some of the conclusions we have reached.

Each emergency and its characreristics has its own causes of occurence, unique scenario, influence on human beings and environment, scales and severity of consequences. It implies that emergency situations can be classified on the basis of numerous features that take into consideration these complex occurrences from different points of view. However, differences between the classifications are a consequence of different definitions of emergency situations as a subject to division. One of the reasons for that is that authors have translated foreign terms literally and without criticism (disaster, catastrophe, emergency) and connect them with our terms, such as emergency situation, catastrophe, crisis, state of emergency. Besides, numerous definitions of emergency situations may have a national or culturological feature which makes difficult the standardization of the mentioned term. As far as the international classification is concerned, the most accepted and most cited is the classification of emergency situations offered by CRED, i.e. the organization for research of epidemiological disasters that has been longing for years to adopt the international definitions and classifications of emergency situations. All this has as a consequence the fact that numerous classifications of emergency situations express specificities of their countries of origin.

Although intensive efforts have been made by the international organizations, state bodies and organizations, as well as by individuals to accept their proposed classifications of emergency situations as universal, the mentioned classifications of various authors, organizations and institutions around the world unambiguously testify that this has not yet happened. Therefore, we can say that there is no accepted (adopted) and universal classification of emergency situations.

Generally speaking, all emergency situations can be classified in three framework types: natural emergency situations, emergency situations that are related (directly or indirectly) to the human beings (they are called anthropogenic, technological, technical-technological, social) and hybrid emergency situations (combination of acts of natural forces and the influence of human decisions). Therefore, the mentioned classifications have been derived by means of the criterion of cause that has a generic-structural characteristic, i.e. it fulfills logical requirements of classification. The common feature of all emergency situations regardless of the type is related to their consequences. By combining the criteria of cause and consequence, intensity and consequences, etc. valid complex typologies are being obtained. Besides, emergency situations are divided into groups, sub-groups and incidents, i.e. the so called "classifying systems".

When making a classification of emergency situations, researchers, organizations and institutions use various criteria, some of which have a theoretical or pragmatic-teleological importance. Therefore, understanding of definitions and classifications of emergency situations serve to the researchers and organizations around the world as a good platform for research, database managing, better analysis of them all and practical implementation of derived conclusions.

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