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Research of safety management indicators

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Abstract. Safety is one of the basic needs of every citizen, company, city, region, and state. Long-term solutions to safety issues have brought 6 pillars to this area (ie physical security, fire safety, safety and health at work, environmental safety and security, operational safety and security, information security). The mentioned safety/security pillars comprehensively cover the area of safety within the company, region, etc. In today's society, it is necessary to focus on the effective evaluation of individual pillars of safety/security. By evaluating them, it is possible to identify places with deficiencies that may be sources of risk in the future. Sources of risk could be identified through a tool that could comprehensively assess all pillars. The result of the evaluation would be the level of safety of the evaluated pillar. Depending on the level of the safety pillar, adequate measures could be taken to address the shortcomings.

Keywords. Safety, safety/security pillars, assessment, risks.

1. Introduction

Safety is a very important requirement for the very existence on Earth, in nature, and in society. In his publication, Belan (2015) argued that safety is a vital interest of citizens, social groups, states, and the international community. Human history itself is interconnected with the search for ways, ways, and forms of ensuring international, internal, and external safety.

Safety was once developed in military and military-political theory, but now it extends in various directions. Safety can be perceived from the point of view of personal safety, which manifests itself as a need to protect the health, for example. Safety is not just about people. The current need to address the security of entities with significant assets that need to be protected has increased. Safety is currently threatened by technological progress, which on the one hand brings many benefits that improve our daily lives, but on the other hand, progress brings with it a number of new dangers and threats. Therefore, it is necessary to focus on the safety management system, which should be integrated into the day-to-day processes of the reference objects. [1]

2. Safety and security

The literature has many definitions of safety. The definition of security is otherwise explained in the field of sociology, economics, political science, or ecology. Korzeniowski defined

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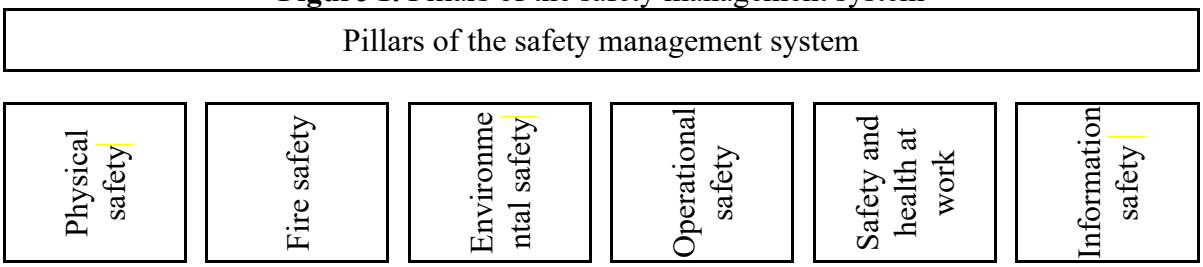
security as a certain objective state, which consists in the absence of a threat that individuals or groups of people subjectively feel. Dinesh Mohan, one of the world's leading experts on safety and human tolerance of injuries, defines safety as follows: a condition in which threats and conditions leading to physical, mental, psychological or material injuries are controlled to maintain health, and good self-confidence of individuals and the whole community, the government's remark in the context of dealing with quarantine in connection with the ongoing COVID-19 crisis must be thought of. In the terminological dictionary of crisis management, which was compiled by Šimák, security was defined as a state of the social, natural, technical, technological system or other systems that in specific internal and external conditions allows the fulfillment of specified functions and their development in the interests of man and society. On the territory of the Slovak Republic in Constitutional Act no. 227/2002 Coll. on the security of the state in time of war, state of war, state of emergency, and state of emergency in Art. 1 defines security as a state in which the peace and security of the state, its democratic order and sovereignty, territorial integrity and the inviolability of state borders, fundamental rights and freedoms are preserved and in which the lives and health of persons, property and the environment are protected. [2]

In the current 21st century, this security may be compromised or its level may be reduced by various adverse events. These may be threats of a natural or anthropogenic nature, which may lead to a reduction in the level of security of the protected object and thus to a disturbance of its equilibrium state. Safety and security threats can be defined as phenomena and processes of economic, political, social, military, geopolitical, ecological, scientific-technical, informational, moral-spiritual character at various levels of social life, which directly negatively affect nature and society, threaten their existence, functioning and development. [3] Due to the existence of safety and security threats, it is necessary to focus on the evaluation of the safety/security management system through which we can effectively determine the level of security of the facility and take appropriate measures.

3. Design of safety management system evaluation

Within the research, the faculty has long been dealing with security issues. The evaluation of the safety management system can be performed based on the six pillars shown in Figure 1. Each pillar represents a specific area which must be secured in the building by the applicable legal standards to avoid security breaches. The aim of the proposal for the method of evaluating the individual pillars of security is to take safety and security to a higher level and to enable the identification of deficiencies within individual areas of security. For each pillar, the draft evaluation of the safety management system will identify indicators through which the relevant area will be evaluated.

Figure 1. Pillars of the safety management system



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3.1. The theoretical basis for safety/security indicators

The indicators will be designed for each pillar of Figure 1 so that able to cover the relevant area of safety and security. For the example of evaluation, indicators for two pillars will be displayed in this section, followed by an evaluation to demonstrate a possible way of evaluating the safety management system in practice. Two of the six pillars are chosen to illustrate the new indicators for measuring the level of safety. The theoretical basis for safety indicators.

3.1.1. Environmental safety

The authors characterized environmental safety and security as, the current and future availability of life-supporting ecosystems, the key to meeting human needs and natural processes that contribute to alleviating poverty and conflict. [5] The operation of various facilities is closely linked to the production of various substances that harm the environment. Therefore, the following indicators have been set in the context of environmental safety:

a) Amount of carbon dioxide released into the air

b) Amount of investments aimed at environmental protection

Both indicators are applicable in practice and can be quantified based on internal information located in the relevant evaluated object. Each object keeps records of produced emissions per year because subsequently this information is summarized in statistics. The same applies to the indicator tracking the amount of investment and this information is covered in the financial statements, which are further shifted to the statistics. When applied in practice, this should not be a problem.

Table 1. Indicator - The amount of carbon dioxide (CO2) released into the air

Value	Verbal expression	Description	Item or %
1	Excellent	Amount of CO2 emissions produced from biomass used as fuel, including CO2 emissions that were not caused by the use of biomass in quantities ranging from 0 to 110 Mg per year.	Mg per year
2	Good	Amount of CO2 emissions produced from biomass used as fuel, including CO2 emissions that were not caused by the use of biomass in the range of 110 to 162 Mg per year.	Mg per year
3	Bad	Amount of CO2 emissions produced from biomass used as fuel, including CO2 emissions that were not caused by the use of biomass in quantities exceeding 162 Mg per year.	Mg per year

Table 2. Indicator - Amount of investments aimed at environmental protection

Value	Verbal expression	Description	Item or %
1	Excellent	The company, including municipalities, spends EUR 530,000 or more on environmental protection.	€
2	Good	The company, including municipalities, spends between 529,000 and 180,000 euros on environmental protection.	€
3	Bad	The company, including municipalities, spends less than 180,000 euros on environmental protection.	€

3.1.2. Physical security

Physical security, including object security, is a system of measures for the protection of classified information and sensitive information from unauthorized persons and against

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unauthorized manipulation in buildings and protected areas [6]. Physical security and object security is according to Act no. 336/2004 Coll. provided by mechanical means of restraint according to § 4 and technical means of restraint, physical protection according to § 9 and regime measures § 10. Following the basis of physical and object security, the following indicators were proposed:

a) Breakthrough resistance of mechanical perimeter restraints,
b) Coverage of the external environment by a camera system.

Both proposed indicators can be quantified in practice and thus allow their subsequent evaluation for a specific object. The breakthrough resistance indicator can be set in minutes, which would represent the time when the attackers can overcome the mechanical means of restraint of the perimeter of the area. The indicator related to the camera system can be determined based on the number of cameras, it can be further developed and discussed in more detail what territory the cameras can capture.

Table 3. Indicator - Breakthrough resistance of mechanical perimeter restraints

Value	Verbal expression	Description	Item or %
1	Excellent	The best way to apply protection is to have a breakthrough resistance of more than 20 minutes. These are unbeatable resources.	More than 20 minutes
2	Good	A more suitable alternative is protective equipment characterized by a breakthrough resistance of 10-20 minutes, safety class 3, characterized by high protection.	10-20 minutes
3	Bad	Unsuitable perimetric protection is considered to be fences of security class 1 (where the breakthrough resistance is 0-1 minutes) and class 2 (where the breakthrough resistance is 1-10 minutes)	0-10 minutes

Table 4. Indicator - Coverage of the external environment by a camera system

Value	Verbal expression	Description	Item or %
1	Excellent	The building has a camera system with high technical parameters that cover the entrances and entrances to the building and the surroundings of the building. They provide the security worker with HD images and sound of what is happening around the building.	More than 4 pieces
2	Good	The building has a camera system with good technical parameters that cover the entrances and entrances to the building.	3-4 pieces
3	Bad	The building does not have any camera system at the entrance/entrance to the complex. Alternatively, it has a camera system with poor technical parameters, e.g. does not have HD resolution, non-rotating cameras.	0-2 pieces

3.1.3. Methods of final assessment of the level of safety

An overall assessment of the level of security can be achieved by summing the real items of all security pillars. In this case, only two pillars were used in the tables for a specific object - environmental and physical safety. Subsequently, according to the height of the sum, it is possible to determine the achieved level of security shown in Table 5.

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Table 5 The level of the overall level of security

Value	Verbal expression	Description
12 - 20	Excellent	The buildings included in this group are characterized by a high to the very high level of safety in the individual pillars. Their shortcomings are minimal and have no impact on the safety of the evaluated object.
21 - 28	Good	The buildings included in this group are characterized by a good level of safety in the individual pillars. The evaluation identified several shortcomings that reduced the level of safety. These deficiencies need to be remedied in the future by taking precautionary measures, as they may present the possibility of disrupting certain functions of the building.
29 - 36	Bad	Objects included in this group have significant shortcomings in the individual security pillars. These deficiencies can represent sources of risks that can lead to security breaches and thus disruption of the operation of the facility.

3.1.4. A practical example of the use of indicators

A practical example, see Table 6, is intended as an example of the possibility of applying indicators. Within the practical example, all proposed indicators from all pillars were applied. It is a simplified model that was applied to the selected object of electrical energy. This facility is very important for electricity infrastructure and can even be considered as a potential element of critical infrastructure.

Table 6. Demonstration of the use of indicators

The theoretical basis for safety indicators				
S.n.	**Pillars safety**	**Number indicator**	**Indicator**	**Value**
1	Environmental safety	1.1	The amount of carbon dioxide (CO2) released into the air	1
		1.2	Amount of investments aimed at environmental protection	2
2	Physical safety	2.1	Breakthrough resistance of mechanical perimeter restraints	2
		2.2	Coverage of the external environment by a camera system	2
3	Information safety	3.1	Password identification and authorization	1
		3.2	Information security audit	1
4	Safety and health at work	4.1	Number of work accidents at the workplace	1
		4.2	Periodicity of training in the field of occupational safety and health	1
5	Fire safety	5.1	Fire-fighting measures	1
		5.2	Fire evacuation plan	1
6	Operational safety	6.1	Data backup	1
		6.2	Security plans	2
TOTAL				**16**

Based on the scale set in Table 6, it is possible to claim that the object has reached a total value of 16, which implies that the level of safety in production, i.e. The building is characterized by a high to the very high level of safety in the individual pillars. Its shortcomings are minimal and have no impact on the overall safety of the evaluated object. The level of security is high mainly due to the fact that it is a new building with new modern equipment, which ensures the building at a high level.

Conclusion

Increasing the level of security of buildings is an area that today's society should actively address, especially in view of the growing different types of threats. The proposed tool would

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be an effective way to assess the level of security in the individual pillars of security. In order for the tool to be applicable in practice, it is still necessary to eliminate many shortcomings and fine-tune the details that would make the proposed method more efficient and offer the required informative value for safety assessors.

References

[1] Ľ. BELAN: Security management. Security and risk management. ISBN:978-80-554-1138-5, 193 (2015).
[2] Constitutional Act no. 227/2002 Coll. on the security of the state in time of war, state of war, state of emergency and state of emergency
[3] R. KAČMÁR: Secure your knowledge. What is security? Slovak Security Policy Institute. 1-2 (2016).
[4] A. VEĽAS, V. MACH. Consolidation of the methodology for assessing the break resistance of mechanical barrier equipment for circuit protection. Crisis management. 2. 1-7 (2013).
[5] M. MIŠÍK, Z. LORENČÍKOVÁ: Energy vs. Environmental safety: the case of the Bratislava oil pipeline – Schwechat. Central European Political Studies Review, N. 4, s. 326-344, ISSN 1212-7817 (2016).
National security authority. Physical and object security (2016).