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CHALLENGES TO NATIONAL DEFENCE IN CONTEMPORARY GEOPOLITICAL SITUATION

CNDCGS-2022

3rd INTERNATIONAL CONFERENCE

GENERAL JONAS ŽEMAITIS MILITARY ACADEMY OF LITHUANIA
MINISTRY OF DEFENCE OF REPUBLIC OF LITHUANIA
NATO ENERGY SECURITY CENTRE OF EXCELLENCE LITHUANIA
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The abstracts of the 3rd International Scientific Conference CHALLENGES TO NATIONAL DEFENCE IN CONTEMPORARY GEOPOLITICAL SITUATION contain short reviews of presented works.

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PREFACE

The third international conference *Challenges to National Defence in a Contemporary Geopolitical Situation* (CNDCGS-2022) held on 15 - 16 September 2022 in Vilnius, Lithuania is organized by General Jonas Žemaitis Military Academy of Lithuania, Ministry of National Defence of the Republic of Lithuania, University of Defence, Brno (Czech Republic) cooperation with the NATO Energy Security Centre of Excellence, National Defence Foundation and the Lithuanian Riflemen's Union.

The conference invites practitioners and researchers to discuss important issues related to current and future challenges to European defence capabilities and to collect great innovative ideas for future development. Also, an important contribution is made to defence innovation. The conference aims to attract the attention of the Lithuanian society and increase the attention of the international political community and the U.S. and European decision-makers to the security of the Baltic region.

The aims of CNDCGS-2022 were to share the latest topical information on the issues of national defence in a contemporary geopolitical situation. The papers in the Abstracts presented the following areas:

- Defence Technologies and Aviation
- Cyber Threats and Security Issues
- Democracy, Contemporary Threats and Warfare
- Modern Technologies and Social Sciences
- Multi-Criteria Decision-Making
- Sustainable Defence Solutions
- The Impact of New Defence Technologies on Humans
- Defence Technologies: Education and Training
- Environmental Issues and Modern Technologies
- Challenges to Face New Defence Technologies

The invitations to the CNDCGS-2022 include the instructions on the preparation of reports, abstracts and manuscripts as well as the deadlines for the reports.

The primary goal of the conference is to present the highest quality research results. The key element in attiring the goal is the evaluation and selection procedure developed by the Conference Scientific Committee. All the works presented in the conference and published in the Abstracts undergo the mentioned procedure. The instruction for submitting the proposals, including requirements and deadlines, are published in the Publication Opportunities on: *https://forum.lka.lt/guidelines/*

All the conference participants prepare their research results in an extended abstract format of 500-1000 words, including references, according to the requirements that make our Abstracts book a valuable recourse of new information which allows evaluating the investigations of scientists from different countries.

Prof. Dr. Svajonė Bekešienė

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DEFENCE TECHNOLOGIES AND AVIATION

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Assessment of the Possibility of Using Different Kinds of Civil Aircraft by Terrorists

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Introduction. Authors dealing with security issues consider air terrorism to be one of the new forms of international terrorism that can generate a serious threat to both civilian facilities and the population itself. There is no doubt that it is precisely air terrorism that can also be one of the most deadly forms of intimidating the international community by various types of fundamentalist-extremist groups. This form of terror showed its devastating power in particular in the terrorist attacks of September 11, 2001 carried out in the United States against the World Trade Centre and the headquarters of the US Department of Defence (Pentagon). This attack was the first successful operation of its kind and resulted in more casualties and material losses than any other act of terrorism in world history to date.

It was assumed that the aim of the research was to: assess the possibility of using various types of civil aircraft for terrorist attacks. Bearing in mind the achievement of the assumed goal, the main research problem was formulated in the form of the question: Which of the civil aircraft generate the greatest threat to critical infrastructure facilities and the civilian population when used as means of terrorist attacks?

The article identifies the characteristics of aircrafts, whether or not they prefer them to be used by terrorists. In this matter, it was important to diagnose individual types of civilian aircrafts and unmanned aerial vehicle from the point of view of their ability to cause material and human losses. The results of the research led to the conclusion that the possibility of counteracting this type of terrorist acts requires from the organizers close and multifaceted civil-military cooperation aimed at effective airspace management, including its permanent monitoring and control, as well as the preparation of specialized forces and defence measures. In addition, the use of an airplane with passengers as a kind of guided missile resembling Japanese kamikazes from the Second World War can be very dangerous to the health and life of civilians living in large urban agglomerations. The conducted analysis also showed that this type of terrorist activities can be carried out not only with the use of passenger planes, but also with unmanned aerial vehicles, radio-controlled aircrafts, from which it will be possible to drop an explosive or spray chemical substances or biological agents.

Method of investigation. Theoretical and empirical methods were used to find answers to the main research problem and explore the research subject. The main methods were: analysis and synthesis, analogy, generalization, comparison and inference. The research was based on the analysis of the literature as well as normative and doctrinal documents. Generalization and

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analogy helped define a group of factors that determine the suitability of given aircraft for potential terrorists. In addition, scientific observation where used, which focused on practical examples and attempts to use civil aircraft by terrorists to attack civilian objects from 2001 to 2020.

Considering the large diversity of each types of aircraft, a criterion analysis was used to evaluate them in terms of their suitability for terrorist attacks. The criteria against which individual civil aircraft were assessed included:

- possibility of seizure (possession) of an aircraft by terrorists;
- the use of aircraft in terrorist attacks to date;
- the possibility of stealthily reaching the target of the attack;
- possibility of cargo transportation;
- possibility of transporting people;
- the possibility of obtaining a surprise effect resulting from the use of a given type of aircraft.

Investigation Results. The results of the conducted research indicate that the possibility of use aircraft as a means of terrorist attack increasing not only due to the resulting losses in infrastructure and civilians but due to the spectacular nature of these tools.

In this matter, properly organized air defence is of key importance in every country, and the main goal should be to prevent terrorists - suicides from penetrating by air into the area of civilian facilities located in large urban agglomerations. As a result of the conducted analytical research, three groups of aircraft were selected, which are particularly predisposed as potential tools of terrorist attacks on civilian objects. The first group consists of large-size structures such as passenger and transport planes, the use of which in attacks may cause the greatest losses, both material and human. In addition, it should be emphasized that this type of air constructions have already been used in terrorist attacks and there is still a high probability of their next use. The next group consists of small-sized light and very light airplanes, microlight, unmanned aerial vehicles and radio-controlled models. This type of aircraft and flying machines are in a period of dynamic development and, at the same time, of great interest on the part of terrorist groups.

On the basis of the obtained results, it was also found that in the case of attacks using explosives or taking into account aviation fuel (which, as a result of an aircraft collision with an object, usually explodes), greater possibilities give large aircraft, such as passenger and transport aircrafts. terrorist attacks with the use of unconventional means (chemical, biological and fissile), a better tool may be small-size and ultra-light aircrafts with the possibility of dropping or spraying funds, e.g. agricultural planes.

Conclusions. The research results confirmed that the organization of an effective counteraction system requires the state to apply a wide range of political, legal, economic and order measures, as well as the involvement of specialized and very modern technical devices on board airplanes and in the entire aviation infrastructure. Thus, the interdisciplinary nature of the threat means that security problems of civilian facilities must be solved at various levels with the cooperation of many civilian state institutions and services, including the armed forces.

Limitations. The authors hope that the results of the above research will be able to be used in the practice of forecasting the threat of terrorist attacks using civilian manned and unmanned

aerial vehicles and will contribute to the creation of effective systems to counteract this type of terrorist acts. The constant need to improve the air transport safety system, including increasing the effectiveness of counteracting air terrorism, will require changes in the methods and ways of using forces and means, modification of operating procedures and changes in legal regulations. The above statement suggests that the content presented in this article does not yet constitute a complete and exhaustive solution to the problem of effective counteracting air terrorism, therefore the above issues require further research.

Keywords: *terrorism, aircraft, aviation, security and safety*

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The Concept and Preliminary Design of a New Drone Destined for Military Rescue Missions

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Introduction. Traditional warfare aims to physically defeat the enemy. Logically this should be done at the least possible cost in both equipment and men. The fact of physical defeat makes dead and wounded an inevitable part of any armed conflict. The arms race, however, results in the introduction of newer and newer technologies, for which a considerable amount of money is needed, making war increasingly expensive. New technologies, on the one hand, result in less human involvement in a direct confrontation from the attacker's point of view, but on the other hand they are becoming more and more lethal, and thus more and more undesirable from the point of view of the attacked, whom these means are intended to reach.

The most notable machines that currently have the impact of eliminating humans from direct contact with the enemy are various types of remotely controlled or autonomous drones. Their smaller size compared to aircraft or helicopters makes them more difficult to detect and shoot down. Because of this fact, they wreak havoc and fear in the enemy camp, significantly affecting the outcome of current conflicts [1]. Of course, the tasks that drones perform are not limited to attack, but the aspect of eliminating humans from direct contact with the enemy is one of the main factors considered in this work.

Justification of the concept. The fact of increasing the advantage in the attack causes the need for adequate defense or rescue measures. Thus, the use of remote-controlled drones for rescue purposes seems a natural or even necessary path for the development of military technology. The largest army of NATO, i.e. the United States, announced in 2018 [2] the need for a small rescue flying vehicle, but unlike the proposed solution, it is intended to carry at least two persons. Nonetheless, the stated requirements can or should be taken into account in the development of a new rescue drone concept. This will allow similar standards and smooth use in allied armies.

Main features of the concept. The new concept should take into account the current conditions and manufacturing capabilities in the country where the target drone is to be produced that is, by the assumption, Poland, whose budget and technology development are

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incomparably smaller than that of the USA. The drone should be manufactured as cheaply as possible, using the simplest solutions that provide the expected features. The developed drone will also be able to successfully serve in civilian rescue missions such as ambulance or firefighting.

The main features that have been taken into account from the US guidelines are: STOL (Short Take-Off and Landing) ability and the payload per person of about 160 kg [2]. The speech drone is intended to be unmanned, designed to transport only one injured person to be evacuated from an area of intense combat with the usage of onboard robot. It is intended that the drone will be electrically powered which will reduce the possibility of detection due to acoustic and heat signature.

Preliminary design. The wounded is assumed to be taken onboard with the usage of robot through movable platform and will be transported in a horizontal position (Fig. 1), therefore a natural rotor arrangement seems to be one consisting of two main rotors positioned longitudinally giving the main lifting force and two side rotors giving additional lifting force and together with the longitudinal ones providing an easy control system by changing the rotors speed (Fig 2).

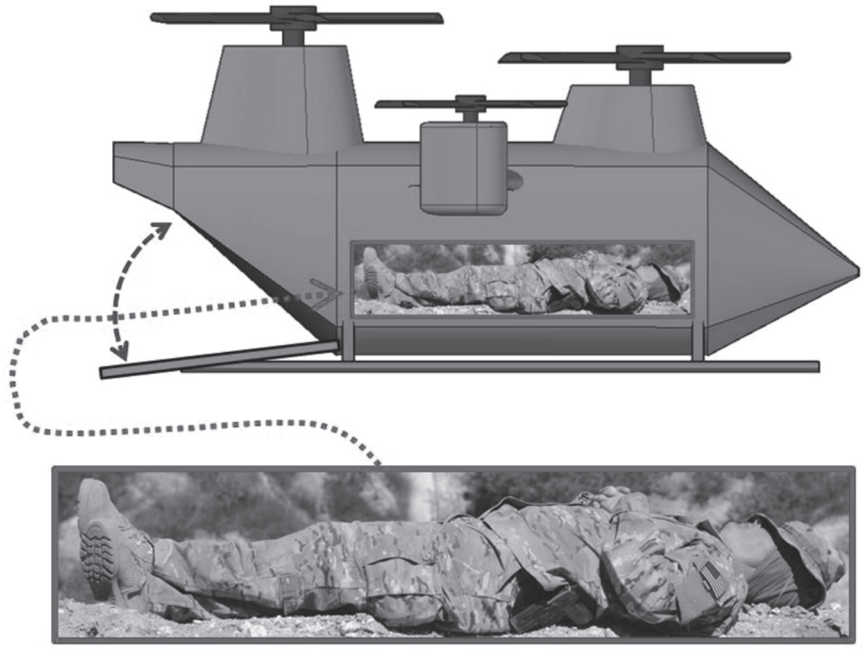

Image of soldier – source: https://assets.rbl.ms/19093255/origin.jpg

Fig. 1 Wounded position and the way of taking onboard in concept drone

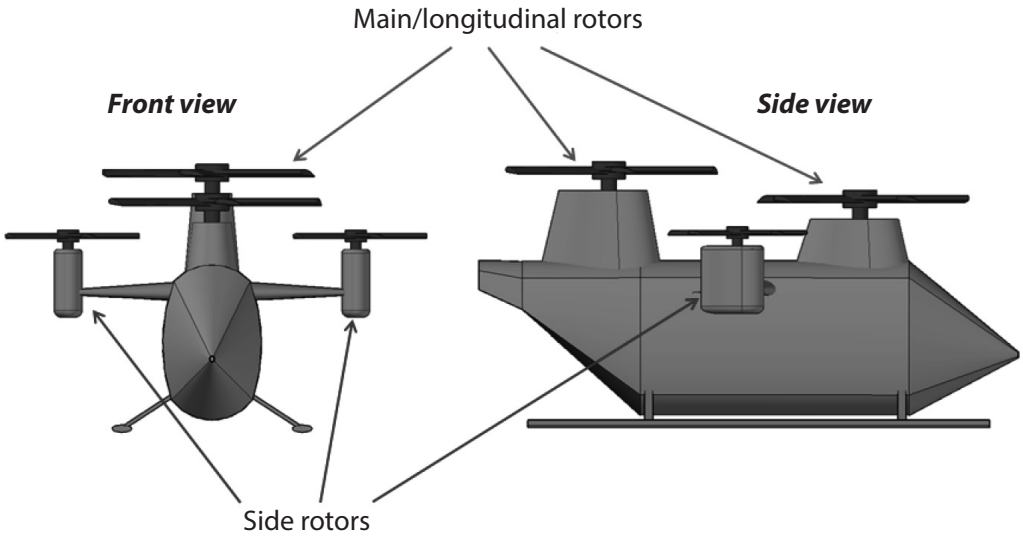

Fig. 2 Overall concept and rotors arrangement

Because of the longitudinal arrangement (of the main rotors), data was collected for similar solutions. Three machines were analyzed: two historical helicopters: HERC Jov-3, its military successor McCulloch MC-4C and contemporary unmanned aerial vehicle (UAV) DP-14 Hawk. It was found that for these solutions the power required to lift one kilogram is about five horse power (5 Hp/kg) [3,4,5].

Based on the input data [3,4,5,6,7,8] and assumptions, preliminary calculations showed that a drone of this type would be able to have a range of 35km (70km round trip) and would have an additional 20 minutes for various air maneuvers related to the task. This seems sufficient to evacuate a wounded person from an area of intense warfare.

Conclusions. The unmanned aerial vehicles or drones are becoming more and more important in the contemporary battlefield. Therefore, the use of remote-controlled drones for rescue purposes seems a natural or even necessary path for the development of military technology. The propelling system of conceptual drone consist of two main rotors positioned longitudinally. The main longitudinal rotors will provide the main lifting force and two side rotors giving additional lifting force and together with the longitudinal ones will provide an easy control system by changing the rotors speed.

The wounded is assumed to be taken onboard with the usage of robot through movable platform and will be transported in a horizontal position. The preliminary design showed that that a drone of this type would be able to have a range of 35km (70km round trip) and would have an additional 20 minutes for various air maneuvers related to the task which seems sufficient to evacuate a wounded person from an area of intense combat. In addition, it should be taken into account that the calculations were made with the assumption of the energy density of the batteries that are currently standardly achievable. Development work aimed at producing batteries with higher energy densities is ongoing. Reducing the weight of batteries in the future will significantly increase range. The designed structure should therefore feature the possibility of changes in the variety of batteries used or, if necessary, to

hybrid propulsion system.

The drone should be manufactured as cheaply as possible, using the simplest solutions that provide the expected features considering requirements announced by the USA – NATO largest member. This will allow similar standards and smooth use in allied armies. The developed drone will also be able to successfully serve in civilian rescue missions such as ambulance or firefighting ones if the life of casual aircraft vehicle operators are threatened.

Acknowledgements. This work was inspired by the late Jerzy Jachimowicz. God bless him.

Keywords: *military rescue drone; UAV; preliminary design.*

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Investigation of Corrosion Resistance of Two-Layer Protective Coatings

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Introduction. Improving the quality of operation and durability of equipment operating in an aggressive environment is directly related to the reliability of anti-corrosion protection of metal surfaces of mechanisms and machines. Polymer composite coatings (CP), including those based on an epoxy binder, play an important role in the complex of anti-corrosion equipment protection methods. Their wide application is due to the availability and low cost of ingredients in the formation of composites, in the form of coatings when applied to complex long-dimensional surfaces. Modern industry places high demands on quality control methods and coating properties during operation. When developing CP, measurements of potential, current, resistance, capacity, their volt-ampere characteristics, determination of the change in mass of the investigated coatings for the product are taken into account. The indicated methods of research do not allow to sufficiently assess the protective properties of CP. It should be noted that the nature of the distribution of residual stresses in the coating, concentration, nature of the filler, interphase adhesive interaction and the operating temperature of polymer composites significantly affect their corrosion resistance.

Method of investigation. Epoxy Dianova resin brand ED-20 (GOST 10587-84) was used to create coatings. Polyethylene polyamine hardener (TU 6-05-241-202-78) was introduced into the dian resin, thoroughly mixed and then fillers were introduced. The concentration of the dispersed filler was varied from 0 to 100 wt. h per 100 wt. h of epoxy binder.

Taking into account that protective coatings are used to protect equipment, the durability of CP to the influence of an aggressive environment using the example of mineral lubricants was selected as an evaluation criterion. As a result of the experimental studies, the values of the characteristics of the corrosion resistance to mineral lubricants at different concentrations of the main and additional coating fillers, as well as - during the electrospark water hammer treatment of the matrix, before the introduction of the filler, were obtained.

In order to confirm the reliability of the obtained results, an analysis of the electrical capacity of the protective coatings was additionally performed. It was experimentally established that during exposure in a corrosive environment, the electrical capacity of the CP increases, which is associated with a change in the dielectric constant of the matrix material as a result

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of sorption. After the medium reaches the steel surface, the capacity of the coating increases in leaps and bounds due to the appearance of the electrochemical component. It is shown that up to 60 days, the capacity of samples from the polymer matrix reaches maximum values and changes insignificantly as the duration of the studies increases. For coatings containing dispersed particles of ferrite and gas soot, the growth of capacity is significantly slowed down compared to other coatings, and only after 120-140 days the capacity reaches values of 170-180 PF/cm2, characteristic of the beginning of the destruction of coatings.

Investigation Results. From the experimental results of comprehensive studies of the corrosion durability of CP, using the method of mathematical planning, the optimal content of polydisperse filler was established, which allows to significantly improve the operational properties of the equipment. Based on the analysis of the obtained results, the significant influence of the interphase physico-chemical interaction on the corrosion resistance of polymer composites is shown, which can be regulated by scientifically based choice of bidisperse filler, its concentration and the ratio of components in the matrix. The effectiveness of applying the matrix treatment by electrospark water impact with the subsequent introduction of a bidisperse filler at optimal concentrations is shown, which will allow to increase the resistance of protective coatings by 0.93...1.24 Ω / cm2, and also provides a significant decrease in capacitance (by 29...51 PF /cm2). The additional use of the adhesive layer in the developed coatings ensures, along with improving the adhesion of polymer composites to the metal base, as well as improving the physico-mechanical and anti-corrosion properties of the composites. It should be noted that the use of developed protective coatings is quite effective when used to protect equipment operating at elevated temperatures. In this case, the electrical resistance changes insignificantly during operation.

Keywords: *corrosion resistance; metal surfaces; equipment; two-layer protective coatings*

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Modelling of Accidental Impacts of Hazardous Chemical Substances in the Czech Republic

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Introduction. From the point of view of history, it is interesting that the Czech Republic has a long and rich history both in the prevention of serious chemical accidents and in modelling their consequences. As early as 1981, the binding nationwide aid CO-51-5 was issued, which included both prevention and the basics of modelling the impacts of the basic twelve hazardous industrial chemicals, but also contained guidelines and clear instructions for creating an internal emergency plan.

With progress in meeting the growing needs of humanity, industrial activity also brings a number of negative manifestations and impacts. One of them is the possibility of a major accident, which may be associated with the release of hazardous chemicals of toxic, flammable or explosive nature. In addition, hazardous chemicals and mixtures may have other significant hazardous properties, as discussed in more detail below.

Several major chemical accidents have been known in history, which have had all sorts of negative effects on people's lives and health, the environment and property. It is indisputable that major chemical accidents will continue in the future. European and Czech legislation, together with a system of various state and branch technical standards, organizational and technical safety measures, seeks to prevent their occurrence, or to minimize their dangerous accidental impacts in the event of major chemical accidents.

Major chemical accidents and their impacts have been gradually published in the Czech professional literature, or Czech translations of important works, such as the valuable OECD professional publication.

Method of investigation. Ammonia and chlorine leakages are modelled in the form of two tables with comments and discussion of the results. These results are compared with each other in terms of their reality and possibility of their use in the framework of the chemical situation assessment by the fire brigade specialist.

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Investigation Results. The article describes the possibilities of evaluating the chemical situation arising after the use of weapons of mass destruction or after the release of selected industrial hazardous substances into the environment. The theoretical part of the article discusses the basic characteristics of the described toxic substances in terms of their classification into risk categories. The article is designed to provide the reader with an insight into the possibilities of using chemical weapons and industrial hazardous substances from the perspective of economically weak states. It is pointed out that toxic substances, which by the extent of their use can be considered chemical weapons, are relatively available and that their use for mass and/or planned to kill of people is relatively simple. The basic aspects of the proliferation of toxic agents are also described in relation to their physical and chemical properties. The practical part of the article deals with the specifications of individual software tools that are used and usable for the assessment of the chemical situation and that are used within the Armed Forces of the Czech Republic and the Fire Rescue Service of the Czech Republic. The individual software tools are very generally described.

Conclusions. The very existence of large masses of hazardous chemicals creates a precondition for possible chemical accidents or even chemical attacks by terrorists. At the same time, huge weights of hazardous chemicals and mixtures are stored, handled and transported in many places in the Czech Republic. This data is relatively easily accessible and therefore unfortunately also misuse.

There are a large number of exploitable sources of risk in industrialized countries and they are often located close to human settlements. In addition, there are many large-scale sources of risk in the form of mobile sources (road and rail tanks), which can be directly targeted at a selected site of chemical attack.

It is also interesting that the first law on the prevention of major accidents was not issued in the Czech Republic until 1999, but since then there have been other significant changes in the law. Therefore, new laws were gradually issued, the latest valid version is Act No. 224/2015 Coll.

Although there are a number of different software tools for calculating the accidental impacts of major chemical accidents, their use is not specified in the legislation. At the same time, it is quite clear that the need for modelling of emergency impacts is not only given by the requirements of the "Act on the Prevention of Major Accidents" and its implementing regulations, but the use of modelling results is much wider.

The results of modelling the accidental impacts of major chemical accidents must then be used quickly and efficiently for the preparation and subsequent implementation of various preventive, protective, rescue and liquidation measures. And the various measures just mentioned above will have a fundamental impact on the protection of the lives and health of people at risk, affected and injured. In other words, the results of modelling can indirectly save many lives, or quickly and effectively protect their endangered health.

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Keywords: *accidents, major accidents, major chemical accidents, hazardous chemicals and mixtures, accident impact modelling.*

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Application of Methods of Preparation of Plasma-Chemical Nano Coatings Designated to Hydrophobic and Oleo Phobic Correction of Surface Working of Textile Materials for Filtration Protective Suit

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Introduction. Protection suits used in the body surface chemical protection against the affects of toxic compounds with percutaneous effects are made not only from non-porous polymeric materials (isolative protection) but also from textile of permeable porous character (filtration protection). The task of these suits is to prevent the permeation of gas, solid and liquid harmful substances with percutaneous effects to the body surface. While hermetic isolative suits made from non-porous materials can protect the user against rain and harmful substances in any form, filtration suits of an adsorption type which is produced from untreated textile materials and they are less resistant against rain and permeation and penetration of harmful substances in a form of drops or roughly dispersive aerosols. Drops of water and drops of harmful substances have a tendency to feather on porous materials in consequence of capillary forces.

This problem is usually solved with hydrophobic and oleo phobic modification of an upper (coating) textile. This classical hydrophobic or oleo phobic impregnation is not cheap, increases the weight of carried textile and even negatively affects their air permeability, flammability, camouflage or physiological properties. This textile can cause an allergic reaction within more sensitive persons. With the development of nanotechnology is very important to find a way how to replace the impregnation. As one from possible solution is usage of a plasma chemical way of coating of nanocoatings with hydrophobic and oleo phobic properties which are better than classical impregnation from the reason of achievement of the super hydrophobic and super oleo phobic effect

Method of investigation. The possibility of creation of nanocoatings with hydrophobic or oleo phobic properties on textiles materials designated for protective suits with plasma-chemical procedures with the employment pf atmospheric plasma without vacuum has been verified. On four samples of selected textile materials without any additional modification (Ba, PES+Ba, PES+Ba+Nomex, Ba+Nomex) has been at the Masaryk´s University (MU) in Brno applied with a plasma nozzle with ten different ways nanocoatings based on siloxane (HMDSO, OMCTS) and nanoglass. Prepared samples have been assessed at the MU in Brno even from the behaviour against freely lying drops of the sulphur mustard point of view. At the Military

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Technical Institute of Protection (VTUO) some selected samples have been subsequently evaluated even from the behaviour of freely lying drops of sulphur mustard. Supposed behaviour of the Chemical Warfare Agent (CWA) of the VX type, sulphur mustard and Soman have been simulated within selected samples with observation of freely lying drops of the olive oil, nitrobenzene, and propanol with similar values of the surface tension as above-mentioned CWA. Founded values of contact angles have been compared with contacts values of contacts angles founded in the scope of two developed materials of the coating textiles for modernized filtration protective garment with classical hydrophobic or oleo phobic modification which have been provided with the company of B.O.I.S. – Filtry, Ltd. Within all samples the change of contact angles in time and also the homogeneity of the modification have been considered. The stability and mechanical sustainability of applied sets against washing has not been evaluated. It has been proved that with the help of plasma-chemical modification is possible to prepare nanocoatings even with ultra-hydrophobic (the contact angle for water is bigger than 150 °) and super oleo phobic (the contact angle for water is bigger than 136 °) properties on suitable textile materials. The best results, so called the effect of a lotus flower, have been reached mainly within two samples of textile materials contented a part of nomex fibes.

Investigation Results. It has been demonstrated by experimental work and subsequent technological design that the proposed procedure for improving the surface properties of textile (sorption) fabric materials, which are used as the basic construction material to produce protective clothing, is functional and applicable for the intended purposes. It has been demonstrated that the effects appearing on the surface of the textile fabrics meet the requirements of a non-technological treatment for protection against the effects of droplets and vapours of coarsely dispersed aerosols of toxic substances and their simulants. The proposed solution will continue to be tested in practice. It is expected that the results obtained will contribute to the improvement of materials currently used to provide long-term protection against the effects of toxic substances.

Conclusions. It has been experimentally verified that with the help of plasma chemical procedures with combination with siloxane or silazane antecedents and nanoglass is possible to apply nanocoatings with super hydropohibic and super oleo phobic properties on suitable textile materials. These properties can significantly increase not only the resistance of the field uniform against the rain but also to significantly increase resistance of textile constructive materials of individual protective equipment and collective protection against drops of chemical warfare agents or other liquid harmful substances. Because the best results have been reached by samples with the part of nomex fibres it is possible to assume that the main reason is above all better terminal stability of these samples. Further research should be focused on this direction. Regarding the fact that the presented information concerned the first orientation experiments the used technologies have not been optimized yet and neither mechanical nor another resistance has been evaluated of prepared nanocoatings. It can be supposed that with further research in this area would be proposed procedures enhanced and confirmed even commercial demands.

With regard to the application of a comprehensive NATO´s approach to the prevention of WMD proliferation and to the protection of CBRN threats and the real demand of NATO for the emergence of new specific CCs capabilities, the issue of WMD elimination and the development of relevant capabilities is very timely. This is clearly an attitude that potentially dictates the future of development in the field of CBRN Defence.

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Keywords: *Hydrophobic modification, oleo phobic modification, chemical warfare agents, chemical resistance, harmful substance, nanocoatings, effect of lotos flower*

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All-Season Tires and their Inappropriate Selection Due to the Current Economic Shortage of Raw Materials

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Abstract

The article informs about the current development of raw materials needed for the production of tires, while its main goal is to acquaint and warn readers about the inappropriate choice of preference for all -season tires. The choice of all-season tires and their preference over standard footwear is often chosen by car users, mainly because of financial savings. At present, this type of footwear can be chosen by other drivers due to the current shortage of raw materials for tire production. Therefore, the intention of the author of the article is to emphasize the controversy of preferring all-season tires in general, to specify their pros and cons with a focus on their reliability and safety.

Keywords: *tire, all-season tires, raw material, tire life cycle, cost savings, braking distance, reliability, safety*

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Some Current Approaches to the CAF Chemical Corps Potential Employment in Operations for Elimination of Weapons of Mass Destruction

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Introduction. The events surrounding the current situation in Ukraine clearly demonstrate that weapons of mass destruction are not a settled issue. Information suggesting that the use of Weapons of mass destruction (WMD) is real and possible appears in the press and in the media space practically every day. This fact points to the need for permanent preparedness for the threats associated with WMD. It is also evident that the treaties that are supposed to guarantee the processes associated with WMD disarmament have not been and are not being enforced effectively. Everything that has been stated so far should be seen as a permanent challenge to the contemporary world and to the bodies responsible for the disarmament of WMD. Now, we have to work with the reality of the contemporary world, namely that this type of weapons still exists and that it represents a real and very dangerous threat against whose effects it is unrealistic to provide perfect protection.

A threat of WMD spreading and related technologies, an effort of state and non-state participants about production of chemical, biological and nuclear (CBRN) materials or presence of real arsenals of WMD on the territory of problems states in an indisputable fact and a security reality of the current time.

Programs for WMD production are launched with enemy states or even non-state subjects for determent or the threat of any opponents to a certain degree. From that reason elimination of enemy abilities in gaining, storage and usage of these weapons can be a key task for achievement of the final state of extended military operation. The question is to what degree the Czech Armed Forces (CAF) Chemical Corps (CCs) dispose of the ability to participate on such as operation.

Method of investigation. The article analyses the place and role of chemical warfare and the understanding of the issue of weapons of mass destruction within the broader perception of aspects related to doctrinal development. It discusses activities that prevent the use of weapons of mass destruction in military operations, that is, the focus is on preventive activities and actions. The problematic aspects mentioned are presented in a context that touches on the strategic perception of WMD issues not only within the North Atlantic Treaty Organization,

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but also within the United States' understanding of the problem.

The main focus is on cases in which armed forces could be deployed to eliminate the use of weapons of mass destruction. These cases are analyzed and discussed with a focus on the possibilities of an appropriate response to These cases are analyzed and discussed with a focus on the options for an appropriate response to the threats associated with responding to the possible use of WMD.

Investigation Results Furthermore, a new concept for the implementation of CBRN Defense within the Czech Republic Armed Forces is presented, which should respond to new challenges in the studied area.

Conclusions. Elimination of WMD will most likely be the part of future military operations. It seems to be beneficial to create a national legislative framework for these tasks, to create an organization with a clear command and control structure and with trained staff composed of both permanent and volatile but pre-identified elements. The area of WMD elimination is too important for its executive units to be set up on an ad hoc basis, which is one of the main conclusions of the operations so far carried out. With regard to the application of a comprehensive NATO´s approach to the prevention of WMD proliferation and to the protection of CBRN threats and the real demand of NATO for the emergence of new specific CCs capabilities, the issue of WMD elimination and the development of relevant capabilities is very timely. This is clearly an attitude that potentially dictates the future of development in the field of CBRN Defence.

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Keywords: *prevention, chemical corps, weapons of mass destruction, elimination, capability, CBRN, proliferation, exploitation*

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Diffuse Reflectance of Thin Films with Defects

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Introduction. This article presents the method of the optical analysis of thin films with defects. The attention is devoted to the defects consisting in boundary roughness. This method is based on interpreting the spectral dependences of the diffuse reflectance [1-5]. Thin films are used in the optical and military industries and in military applications, for example for the creation of anti-reflective layers or laser mirrors [6].

Method of investigation. The formulae expressing the diffuse reflectance of thin films with rough boundaries are derived within the scalar theory of diffraction. The influence of the rms values of the heights of the irregularities and the correlation length of these irregularities of the boundary roughness of thin films is studied [7-8]. The following assumptions of a physical model of the multilayers must be fulfilled (e.g. [6]): Boundaries are locally smooth, the shadowing and multiple reflections among the irregularities of the multilayer systems can be neglected, the stationary isotropic normal stochastic process generates roughness of the boundaries and the mean values of random functions describing all the rough boundaries are equal to zero. The mean levels of all the boundaries are formed by mutually parallel planes, the rms values of the height of the irregularities of all the boundaries are smaller than the wavelength of the incident light. The dimensions of the illuminated parts of the boundaries are much larger than the wavelength. Materials forming the multilayer system are homogeneous and isotropic from the optical point of view.

Investigation Results. The numerical analysis confirms the fundamental influence of the parameters of the defects of thin films on the diffuse reflectance. This numerical analysis is introduced for single TiO_2 layer on glass. Formulae presented can be utilized for interpreting corresponding experimental data in a successful way.

Conclusions. In this article it is shown that the formulae presented can be used for interpreting the spectral dependences of the diffuse reflectance of thin films systems with rough boundaries. The influence of the defects of thin films on the diffuse reflectance is relatively great compared with the usual experimental uncertainty. The influence of the acceptance angle of the detector on the diffuse reflectance of thin films is described too.

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Keywords: *diffuse reflectance; thin films; rough boundaries; optical quantities; optical analysis.*

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Drones in Military Conflicts. Are Unmanned Aircraft Systems the Future of Wars?

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Introduction. The use of unmanned aircraft systems (unmanned aerial vehicles), commonly known as drones, has increased dramatically over the past two decades. They became an integral part of conflicts, giving them new dynamics and unpredictability in combat operations. Drones used by both state and non-state actors, are often the means of first choice in contemporary conflicts. This is proven thanks to lessons learned from the global war on terrorism, civil wars in Libya and Syria, and wars in Nagorno-Karabakh and Ukraine. Given the high level of their effectiveness in combat, relatively low-priced acquisition and service, and availability, it comes as no surprise that they are widely engaged on the battlefield. On the other hand, they have sparked off a debate in the media and among experts as to whether they are just another tool of war or a revolution in war.

However, practices from conflicts of the last two decades, in context of drone engagement, may differ significantly from each other. The use of drones against terrorists, in conditions of having air superiority, will not be identical to actions against a state that possess air defence systems ensuring the maintenance of an appropriate level of control of the air. Therefore, lessons learned regarding the employment of unmanned aerial vehicles in a given conflict cannot be uncritically translated into universal use of drones in wars and conflicts.

The aim of the research is to identify lessons learned from employment of drones in recent conflicts: global war on terrorism, Libya, Syria, Nagorno-Karabakh and Ukraine. The results of investigation answer the question whether or not are actions of drones revolutionary in contemporary conflicts taking into account identified lessons learned from selected conflicts.

Method of investigation. Collective and explanatory case study method was carried out to identify lessons learned from selected conflicts. Besides, the research was conducted through qualitative analysis of literature from open sources and databases including scientific articles, media opinions and think-tank papers related to utilization of drones in contemporary conflicts.

Investigation Results. Unmanned aerial vehicles play a crucial role in contemporary armed conflicts. Their scope of tasks has evolved from a typical ISR missions to lethal machines that independently search for and strike enemy targets including kamikaze operations. We can observe integration of drones with other weapon systems notably with artillery, and as a support for decision-making processes. The use of drones in modern conflicts involves high-tech technologies capable of flying for hours and accurately strike lucrative targets. On

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the other hand, both state and non-state actors use commercial off-the-shelf drones, which they adapt for military employment on ad hoc basis. Both air defence and electronic warfare systems effectively limits drone's combat capabilities. Despite the widespread use of drones, it cannot be said that their utilization is revolutionizing combat operations. Rather, it is an evolution consisting in qualitative and quantitative increase of air power potential, and their employment in specific situations may contribute to reinvigorating combat operations and achieving local advantage. We can also observe the use of drones by all sides of a conflict as a tool of information warfare and military propaganda. The up-to-date, properly selected message from the battlefield strengthens the morale of troops and civilians and creates the publicity of success.

Conclusions. Firstly, drones should not be perceived as game-changing in contemporary conflicts. In certain circumstances, they may give the conflict a new dynamic, but in strategic terms, they do not change the fate of war. The victory will continue to be determined by potential of land forces or other types of armed forces. Secondly, an appropriate level of control of the air is a *sine qua non* of employing drones in contemporary conflicts, regardless of the type of conflict. Its lack means that their capabilities cannot be fully provided. Thirdly, multilayer air defence is crucial to ensuring the freedom of maneuver of ground forces and security against threats from unmanned aerial vehicles. Providing such air defence effectively eliminates the capabilities of drones. Similarly, electronic warfare systems effectively eliminate or limit the capabilities of drones. And the last but not least, the employment of unmanned aerial vehicles in combat operations should be a part of the concept of using air power, and more broadly, an element of a defence ecosystem. This system should provide access to various technologies of unmanned aerial vehicles as well as adequately trained and experienced personnel. Then the use of drones will ensure achievement of synergistic effects in combat.

Keywords: *air defence; drones' wars; lessons learned; unmanned aerial vehicle; war in Nagorno-Karabakh; war in Ukraine.*

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Current Considerations for Air and Missile Defense

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Introduction. Air and Missile Defense (AMD) is the foremost concern of all commanders and politicians responsible for safety of civilian population, infrastructure, and military forces. It is understood as a broad, complex, and multifaceted set of measures continuously taken in peace, crisis, and war directed at nullifying possible air threats of all types. The measures comprise active and passive activities conducted by specialized and non-specialized means, that in general covers early warning, fire, C2, and survivability. The level of effort for assuring reliable and effective AMD depends to great extent on possible air threats and threat perception, risk acceptance, and available capabilities. The latter relate to approaches, methods, and concepts that are built on the basis of experience, lessons, and balanced calculations. Normally, AMD conducted in a military operation was indispensably connected with offensive counter air (OCA) efforts conducted to nullify air threats at their source. Hence, AMD and OCA together were to achieve air superiority as a state of decent immunity to air attacks.

Lessons learnt from the war in Ukraine pose a good impulse to revalidate approaches to AMD and identify potential new challenges and considerations. It is not a type of conflict we have seen since nineties, where air superiority was taken for granted. In Ukraine Russia has been employing a broad gamut of air threats with putting an accent on surface-to-surface missiles and electronic warfare. It also shows ability to attack Ukraine from the air with ALCM, hypersonic weapons, and combat UAV. Against anticipations there is relatively limited usage of combat aircraft. One of possible reasons is the avoidance of putting them at still existing risk of attrition. Both belligerent sides have some surfaced based air defense capabilities that create contested or degraded hostile environment and as a result they deny air superiority.

The aim of the research is to identify the newest determinants of and implications for AMD conducted against lastly identified threats. The research is directed at conclusions relevant for prospective situation in Europe in relation to lessons learnt from the war in Ukraine. To this end the primary research question to be answered was set as: what current considerations for AMD should be taken into account by a country at the eastern flank of NATO? It was decomposed into three following questions for the study: what are the principles of AMD?; what challenges for effective AMD might be identified from the ongoing war in Ukraine?; what implications and lessons for the prospective AMD should be taken into consideration by NATO front-line states?

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Method of investigation. Throughout of the conduct of the research qualitative and quantitative theoretical methods of inquiry were used. Data were collected from primary and secondary sources bounded to selected documents and audiovisual materials from social media and Internet. As main qualitative methods the theoretical sampling and the constant comparative method were used to collect, code, and analyze data as well as select and group them on a dimension aimed at the research questions. Quality of results were upheld by crosschecking especially in connection to the newest open-source articles and media coverages due to opacity and ambiguity of data connected with the recent situation in Ukraine that was analyzed with a method of case study.

Investigation Results. AMD must be operational and ready for effective use already in peace time to avoid surprise and nullify effectiveness of enemy's air attacks from the onset of conflict. Today's capabilities of potent adversary make the AMD crucial for survivability of our critical resources at the whole theatre of operation and beyond. Broad range of likely air threats forces AMD to be even more diverse and comprehensive, ready to adopt different modes of operation, and able to bring effects while being disintegrated. AMD should adopt multidomain approach in which every domain has its share in the whole system. Diverse weapons (sophisticated or cheap, flexible, and numerous; lower- or upper-tier) and adjusted tactics may lead to suppression or making incapable our active AMD assets, therefore passive AMD is of utmost importance allowing deception, redundancy, or recuperation. It is likely that not all our areas and critical assets will be defended against every potential air threat so their careful prioritization must be conducted up front and the whole defense plan should be prepared accordingly.

Conclusions. The war in Ukraine proves that advances in technology, specific circumstances, and adopted strategy give again a new flavour do fight for air superiority. From point of view of a NATO front-line state, it is important to have a close look at the unfolding situation in Ukraine in relation to AMD. Current requirements for effective AMD call for huge but reasoned and consistent resources and effort. Well known concepts like A2AD, multidomain approach, and integrated AD seems to be still valid but now they should be wisely implemented.

Limitations. The war in Ukraine is still ongoing and there is a lot of unknowns in the realm of public knowledge. Hence, the biggest limitation identified during the research was the lack of data in open sources and uncertainty about quality of available ones. It should be noted that both belligerent parties are employing new means and developing and implementing innovative tactics, technics, and procedures. These novel approaches are seen when both offensive and defensive measures are considered. Therefore, further research is needed on this problem while new data will be brought to the light, especially the ones collected from field research and interviews.

Keywords: *air power, air superiority, air and missile defence, war in Ukraine, air threat, counterair operations.*

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Al2O3/Ni/Ti Composites Enhanced by Intermetallic Phases for Military Applications

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Introduction. An innovative composite in which it is possible to obtain intermetallic phases is the Al2O3/Ti/Ni composite produced by slip casting. The use of titanium and nickel as additional metallic components allowed the sintering process to produce intermetallic phases in the composite, which significantly affect the properties of the composite. Currently, forming methods based on colloidal processes play a leading role in the technology of advanced ceramic-based composites, including tape casting and direct coagulation casting [1], slip casting [2], gel casting [3], and centrifugal slip casting [4,5]. The results of our own research and data from the literature on using the slip casting method for the production of ceramic–metal composites show that it is one of the most effective methods of forming such composites [6]. In recent years, intermetallic compounds have often been used to improve the mechanical properties of metallic materials applied in military industry, including light-alloy multilayer composites.

In this study, ceramic–metal composites in the Al2O3/Ti/Ni system were fabricated using the slip casting method. Two series of composites with 15 vol.% metal content and different solid phase contents were obtained and examined. A proper fabrication process allows obtaining composites enhanced by intermetallic phases. The microstructure of the base powders and sintered composites was analyzed by scanning electron microscope. The phase composition of the sintered samples was examined by X-ray diffraction analysis. A monotonic compression test was used to investigate the mechanical properties of the composites.

Method of investigation. In the present study, the powders used to prepare the slurries and sintered composites were aluminum oxide TM-DAR. Used as a composite matrix, and the metallic powders: titanium and nickel. In the first stage of the research, the base powders were investigated. X-ray diffraction (XRD) phase analysis was performed to determine the phase composition of the raw powders. Moreover, the phase composition studies were carried out for the composites in the raw state and after sintering. This allowed estimation of the intermetallic phases in the investigated series of composites, especially in the sintered composites.

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The mechanical properties of the sintered composites were investigated. In addition, a monotonic compression test was carried out on a 5000 kN hydraulic pulsator. Results of the tests are presented in plots, which show the compression strength of the specimen (MPa) as a function of the displacement of the compression plate. Microstructural investigations were performed on the fractures after monotonic com-pression tests. The microstructure was observed using a scanning electron microscope (SEM) equipped with an SE (secondary electron detector) and BSE (backscattered electron detector). In addition, surface microanalyses of chemical composition were performed using an energy dispersive X-ray spectrometer (EDX). The EDX results were generated in maps of elemental distribution on the studied sample surface.

Investigation Results. Figure 1 shows the morphology of the starting ceramic and metallic powders visualized by the scanning electron microscope.

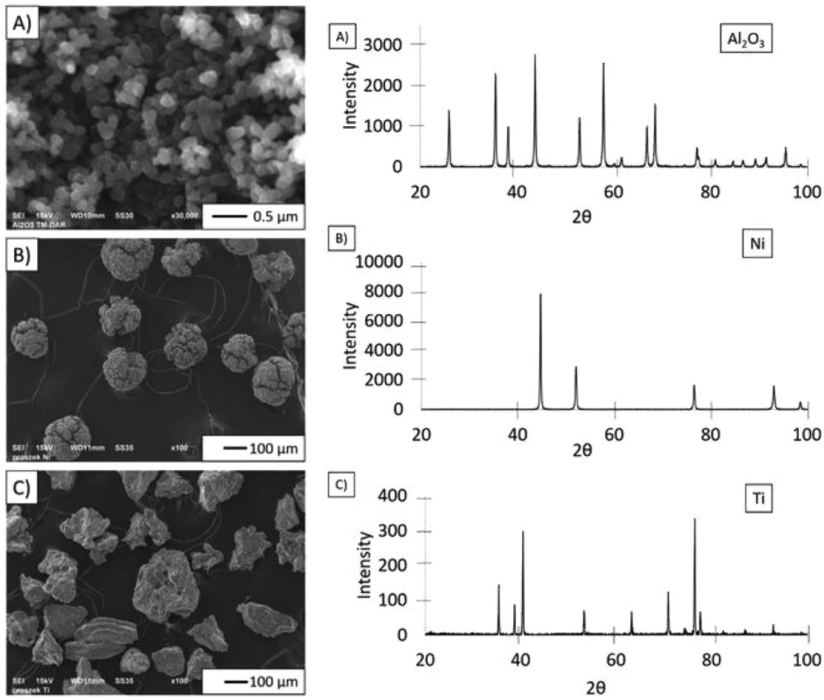

Fig. 1 Microstructure and X-ray diffractograms of the powders:
(A) aluminium oxide; (B) nickel; (C) titanium.

SEM micrograph analysis showed significant diversification in the morphology of the powders applied in the study. It was observed that both Al2O3 and nickel powders (Figure 1A,B) featured a quite regular morphology with rounded edges and shapes mostly close to spherical. It has also been noticed that the surface of the nickel particles is rough with a lot of cavities. Furthermore, it was observed that the Al2O3 powders are characterized by the tendency to form agglomerates. The direct observation of the metal powders allowed us to find that titanium powder shows a highly irregular shape (Figure 1C). Figure 3 shows the results of phase analysis of base powders. Phase analysis results of all base powders revealed the absence of peaks coming from other phases, which confirms the high purity of alumina, nickel, and titanium powders declared by the manufacturer.

The next study was the characterization of the sintered composites. The XRD results of the investigated composites revealed a TiNi intermetallic phase in the composite containing 35 vol.% solid phase (Figure 2A). In the case of the composite containing 50 vol.% solid phase (Figure 2B), two types of intermetallic phases were revealed: TiNi and Ni3Ti. The sintering temperature (1400 °C) causes the melting of the vast majority of Ti-Ni phases (including intermetallic). For this reason, the only time these compounds can form is during the cooling stage at temperatures starting from 1380 °C, 1310 °C, and 984 °C for TiNi3, TiNi, and Ti2Ni, respectively. Therefore, in the 50/50 Ti–Ni system, the TiNi phase should be intermetallic with the highest participation, corresponding to the obtained results. At the same time, an inevitable local heterogeneity in the concentration of Ti and Ni in the metallic phase can promote the formation of other phases (e.g., nickel-rich TiNi3).

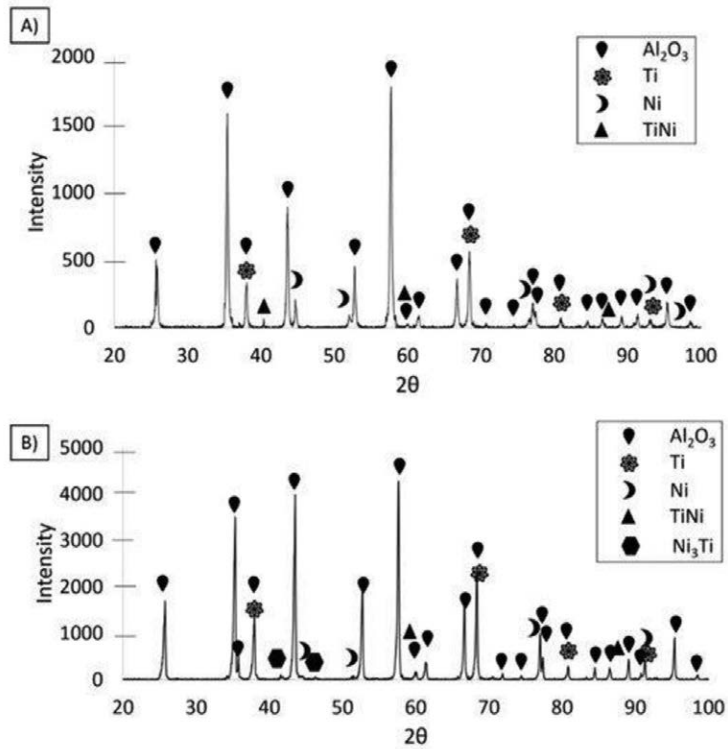

Fig. 2 The phase composition of the sintered composite from (A) Series I, and (B) Series II.

Conclusions. The results provided new fundamental knowledge about ceramic–metal composite materials of Al2O3/Ti/Ni system formed by the slip casting method and reinforced with intermetallic phases. The slip casting method allows the production of composites containing aluminum oxide, titanium, nickel, and TiNi and Ni3Ti intermetallic phases. The particles of the metallic phase are dispersed throughout the volume of the composite samples. An irregular shape characterizes the metallic phases. The developed methodology for obtaining ceramic–metal composites reinforced with intermetallic phases provides a starting point for application-related work. The results obtained are of high scientific value and application potential. This research represents the development of a technological basis for the production of new innovative Al2O3/Ti/Ni composites reinforced with intermetallic

phases. Work on this subject is in progress and new results will be published in succeeding articles.

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Keywords: *slip casting; composites; Al2O3/Ni/Ti; intermetallic phases.*

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Approaches to the Conduct of Electronic Warfare in Support of Joint Operations

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Introduction. Contemporary and emerging security threats, including increasing capabilities and ambitions of near-peer adversaries, paired with lessons learned from recent and ongoing military operations have proved that in order to achieve operational objectives in the traditional physical domains (land, air, maritime, space), it is crucial to ensure dominance in the non-physical ones, including the electromagnetic environment.

Large-scale cyber-attacks against Estonia in spring 2007 [1], or occurrence of electronic jamming of global positioning system reported during NATO exercise "Trident Juncture" in northern Norway in 2018 [2] are just some notable examples of the fact that NATO countries have been challenged by attacks in the non-physical domains for several years. With the onset of the Russian invasion of Ukraine, the incidence and intensity of both offensive and defensive activities has grown enormously. Therefore, as part of development of new strategies reflecting the changes in the security environment, NATO countries should not only to revise, but also continuously adapt, develop and enhance their existing electronic warfare capabilities.

Electronic warfare can be perceived as a capability which is based on the combination of its activities or defensive, offensive and information measures to ensure superiority of friendly forces in the electromagnetic spectrum. At the same time, it can be viewed as a specific military activity in the electromagnetic spectrum, which can influence or deliver pre-planned effects in any of the operational domains, including space.

Unique capabilities of electronic warfare assets primarily enable exploitation of electromagnetic energy to identify imminent threats in the electromagnetic environment, to deny or restrain the adversary from effective use of the electromagnetic spectrum, while simultaneously creating favourable condition for friendly use of the electromagnetic spectrum. At the same time, electronic warfare also provides information support to the intelligence cycle and significantly contributes to situational awareness, and this is also why electronic warfare still falls within the realm of intelligence in some NATO countries.

The article also elaborates on the relationship and contribution of electronic warfare to combat support to other military capabilities in the battlefield. One of them is Joint Intelligence Surveillance and Reconnaissance (JISR) which can be described as a set of intelligence and operational capabilities synchronized and coordinated in a manner which

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facilitates planning and execution of joint military operations by multiple services of military forces [3], where electronic warfare provides mainly inputs to target acquisition and situational awareness. Another aspect covers electromagnetic operations, all operations that shape or exploit the electromagnetic environment or use it for attack or defence including the use of the electromagnetic environment to support operations in all other operational environments [4].

Method of investigation. Based on the theoretical research, series of situational survey conducted in the Army of the Czech Republic in the period between 2017 and 2022, and the authors' professional experience within the field of electronic warfare, the text describes and analyzes potential approaches to the management and organisation of activities, measures and tasks of EW in order to provide combat support to combat services in the complex electromagnetic environment at the joint level. The authors compare and discuss advantages and disadvantages of centralized, decentralized and hybrid approaches with respect to the specific characteristics of EW assets, needs of military services, missions and challenges posed by the contemporary as well as future military operations.

Investigation Results. The survey indicated that centralization of electronic warfare assets and capabilities into a single provider unit was probably the most appropriate solution in the context of the Czech Armed Forces; thus enabling efficient development of specific capabilities, while providing combat support to maneuver units.

Conclusion. In comparison to a standard NATO approach, where electronic warfare activities and measures are normally coordinated by the operations staff, some of the former Warsaw Pact countries, including the Czech Republic, still tend to view electronic warfare as part of their intelligence support. Therefore, one of the most pronounced challenges for these countries is to create a solid doctrinal base for their electronic warfare which should be compatible with NATO doctrine. In addition, transformation of theoretical knowledge and practical skills related to electronic warfare into military practice is also very important. It can be achieved by appropriate integration into the processes of military education and training; however, this does not apply exclusively to electronic warfare specialists, but to all military personnel of the armed forces. Without common doctrine and understanding of the role of electronic warfare the friendly forces cannot be expected to achieve superiority in the electromagnetic environment.

Limitations. The work strictly adheres to limitations due to classification; therefore, only non-classified documents were used during preparation of this submission. The survey targeted a limited number of the Czech Armed Force professionals involved in the area of electronic warfare.

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Keywords: *electronic warfare; electromagnetic spectrum; military operations; operating environment; situational awareness; threats.*

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Analysis of Potential Cyber Threats for Autonomous Vehicles from Military Perspective

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Introduction. Around 120,000 cyber-attacks occur every day around the world, and they are on the rise every year. These attacks cause disruption and enormous damage, but they cost extremely little to carry out - on average around USD 100 [1]. Often, when people talk about cyber security, they think of mobile phones, cameras, computers and similar smart devices, but the threats posed to small electronic devices are also relevant to a completely different type of invention - autonomous vehicles. Cyber-attacks can invade people's privacy and cause material damage. Such attacks can cost lives. Analysts estimate that 25% of vehicles will be autonomous vehicles by 2040 [2]. While there is a wealth of data on cyber security, autonomous vehicles at Level 5 and Level 4 (the truly driver-less modes) have not yet been sufficiently researched, so investors and stakeholders are still skeptical about fully autonomous vehicles. At the same time, many nations are developing autonomous vehicles for military application. This work analyzes known cyber threats to autonomous vehicles with the aim to provide guidance to cyber warfare practitioners on where autonomous vehicles are weakest and what capabilities to develop in order to perform attacks against them.

Method of investigation. In this work, the perception, network and application subsystems that make up an autonomous car have been examined in detail in the context of confidentiality, integrity and availability criteria. The perception subsystem is usually composed of ultrasonic sensors, GPS transmitters and receivers, radars, cameras, light detection and ranging system (LiDAR); the communication subsystem has elements such as Controller Area Network (CAN), Wi-Fi, Bluetooth, internal wiring; and the application group has internal computers, engine control units, information repositories [3]. One of proposed threat assessment models is called DREAD [4], it rates threat level in each of the five categories: Damage potential, Reproducibility of the attack, ease of Exploitability of the vulnerability, number of Affected users, and the ease of Discoverability of the vulnerability. The model was extended with additional three components to fine-grain the exploitability criterion: the attack Distance, Time needed to perform the attack, and Cost of the attack (including the cost of equipment and human resources). Most common elements of each subsystem were evaluated using the extended DREAD model.

Investigation Results. The main method analyzed in the literature is the intervention in the communication, in this case between the vehicle and its operator. Such intrusion is possible either by connecting to the device receiving the signal or by interfering between the sender

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and the receiver. The core and most challenging aspect is to find out what communication methods and technologies are used by the autonomous vehicle. In military applications, this information is highly concealed, making it easier to disrupt such communication by simply creating enough noise (jamming) in that part of the spectrum [5]. This type of attack is the optimal way to stop an autonomous vehicle from communicating with an operator or other means in the same communication network. However, this is one of the most notorious types of attack, and new technologies are trying to prevent it in a variety of ways: by hopping the frequency, by hiding in the spectrum of high-noise waves, or by installing automated code that kicks in when communication is lost. Therefore, after analyzing the possible threats and the modules of the autonomous vehicle, it has been determined that the optimal way to disrupt, stop and prevent a military-type autonomous vehicle from functioning is to block individual sensors. Devices such as LiDAR, video cameras, or ultrasonic sensors can be compromised from a long distance by laser weapons or other (including kinetic) means [6].

Conclusion. Given the military applications of autonomous vehicles, the most effective method of attacking them at present is to suppress (blind) elements of the communication and perception subsystem, rather than attempting to intercept or overtake communications. An attack targeting communication (jamming) would be ineffective if the vehicle had a sufficiently advanced autonomous behavior (including target detection and destruction) mechanism based on machine learning, but even then sensor jamming would have a strong effect. From a defense perspective, the protection of these sensors should be a priority.

Limitations. The work is based on a literature review and on the available technical parameters of common autonomous vehicle components. Specific vehicle models may have differently vulnerable components or systems and should therefore be analyzed separately.

Keywords: *autonomous vehicles; cyber security; electronic combat.*

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Geoinformation Portal as a Component Unified Geoinformation Environment

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Introduction. The current views on armed struggle, their impact on the using of the troops (forces) in the war with the Russian federation, new asymmetric threats to Ukraine's national security, and the reform of the Armed Forces of Ukraine require a review of information requirements in general and geoinformation in particular.

The development and introduction of new weapons, the ephemerality of the armed struggle at the present stage require a significant increase in the efficiency of the military management system. In solving this problem, one of the key roles should be played by geoinformation support as a tool for analyzing the operational situation and a means of automating the process of making managerial decisions by military authorities' officials. According to current trends in information systems [1], the Unified Geoinformation Environment of the Armed Forces should be formed as a set (network) of interconnected geoportals, the purpose of that is to consolidate information on available in the Unified Automated Control System of the Armed Forces (AF).

Investigation Results. Based on the main tasks [2], the geoinformation support is the modern spatially distributed subsystem of system-wide information support of the Unified Automated Control System (UACS) of the Armed Forces, that is able to process spatial data in conjunction with other information circulating in it. The review of various areas and examples of the use of geoinformation technologies in military affairs [1,3], as well as the relevance of developing automated geoinformation subsystems of military management [1,2] necessitate scientific substantiation of the creation aspects and operation of geoinformation portal as an important component of geoinformation environment.

The foundation of the Unified Geoinformation Environment of the Armed Forces can be service-oriented architecture (SOA) of distributed geodatabases [4,5]. The purpose of deploying service-oriented architecture is to provide a unified form of information resources management of the Armed Forces. The main role of the SOA is that it provides the common platform for all actors and users to access the resources of the UACS of the Armed Forces.

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In the case of flexible design methods, the transition to SOA should be through one or more pilot projects.

The basic means of the geographic information environment of the UACS of the Armed Forces should include server components that are specifically designed to support the SOA (both tools and tools to support its operation). This model of the spatial data organization goes beyond editing the unified geodatabase by creating the decentralized geodatabase. Many entities (users) can publish their data and register it for search and use by any number of remote users. Those, in turn, can either download the data set in full, or use cartographic WEB services (WMS) to dynamically sample and download the small amount of data needed in their current map extent. The process of asynchronous editing and publishing can be extended to support the process of data distribution according to the subscription, with that each user can access the updated data only when they need it [3]. At the same time, an important condition for the creation of the Unified Geoinformation Environment of the Armed Forces is to ensure the process of disparate data's integration. One of its types is WEB-integration, that is most appropriate to use in our case. During its implementation, the data remains with the owners and even their location is unknown. The query refers to certain services that are related to the sources where the information is located and its specific address. The data integration integrates information from multiple sources so that it can be provided to the end user as the service. The SOA approach focuses primarily on identifying and sharing services in the form of services with relatively limited number of the key functions in the UACS AF. Thus, the service-oriented interfaces are based on the limited number of requests for the necessary information to be provided to the consumer [4,5].

Analyzing the technical aspects of spatial data integration and modern server technologies for access to resources, it can be argued that the most optimal way to create the unified geoinformation environment for the UACS AF is to implement a geoinformation portal of the Armed Forces (hereinafter – the geoportal). It's the software information and communication platform designed to create the Unified geoinformation and information-analytical environment of military authorities, military units and subdivisions of the Armed Forces with delimitation of users' access rights to these resources.

The geoportal as a set of software and hardware, network services and geospatial data services that provide display in the geodata network, must perform the following main tasks:
– the processing and issuance of information on automated workplaces (hereinafter AWP) of military administration bodies officials (military units);
– the providing access to the unified geographic information space to officials of military administration bodies (military units, subdivisions);
– the ensuring cooperation with other military formations and law enforcement agencies within the unified geographic information space;
– the providing search / access to necessary information.

As a software component, it's optimal to use ESRI's ArcGIS server multi-user software with Enterprise performance level and Advanced functionality class.

Conclusions. Thus, the implementation of the Geoinformation Portal of the Armed Forces during hostilities should provide the following:
– the formation of the unified information space within the theater of operations of troops (forces);

– the reflection of the state of the area, as well as the operational situation;
– the generalization (scaling) of cartographic information depending on the tasks to be solved;
– the suppling of cartographic data to ensure the setting of tasks for the implementation of commanders' decisions of all levels of the subordination's hierarchy;
– the processing of coordinate and raster (space images, aerial, photo) information from all types of intelligence;
– the providing technologies for automated analysis of the combat situation;
– the geoinformation support of automated solution of tasks related to the types of operational support of the Armed Forces;
– the ensuring the compatibility of automated systems and means of automation of the UACS of the Armed Forces in terms of spatially distributed information with other similar systems in terms of performing tasks in the coalition of troops (forces).

Keywords: *Unified Automated Control System of the Armed Forces, geoinformation support of troops, service-oriented architecture (SOA), geoportal.*

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Mapping Growth of the Russian Domestic Propaganda Apparatus on Telegram

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As a part of Western sanctions against Russia, big social media companies i.e., Facebook, Twitter, and YouTube, have been limiting their functionalities available to Russians and suspending and limiting reach of Russian influencers.

Many Russian propagandist, aware of the risk of becoming deplatformed, were already looking for social media platforms with less moderation before the February 24th. With many Russians using Telegram as their preferred communicator, Telegram became the natural choice. Russian government, by blocking access to Western social media platforms by Russian users and by directing state influencers to migrate their domestic audiences to Telegram has accelerated this trend, see Figure 1.

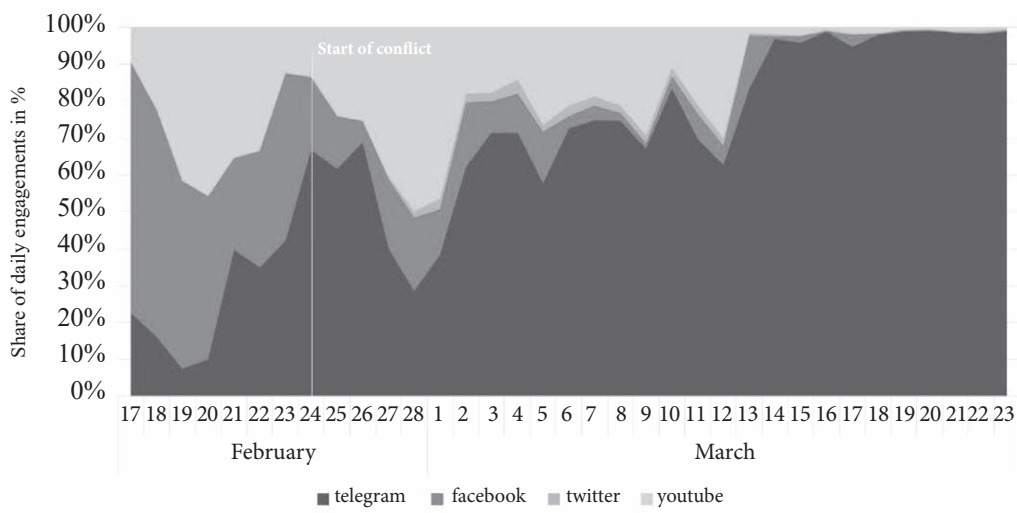

Fig. 1 Share of engagements devoted to conflict in Ukraine on Russian social media by platform.

Despite many advantages, Telegram is limited in ease with which new content and channels can be discovered. Telegram search for channels is based on exact string matching and Telegram has no content search or content recommendation functionality built into it. Telegram's advertising mechanism is still in its infancy.

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To enable quick growth of the key state propaganda channels, Russians employed several tactics. They have selected a few existing influencers, such as Vladimir Soloviev, to substitute for the absent search and recommendation engine.

Investigation Results. Soloviev's Telegram channels has been heavily advertised on legacy media, starting with TV stations carrying his programs, to serve as an onramp to Telegram. Soloviev has regularly featured reviews of other smaller channels, endorsing, and promoting their pro-conflict content, becoming the missing recommendation engine for Russians. All the above resulted in creating a vast, Telegram-based apparatus of domestic state propaganda, see Figure 2.

In this paper, we trace the growth of Russian pro-conflict Telegram communities and quantify the impact of centralized endorsement by state influencers on the growth of other smaller, specialized Telegram channels.

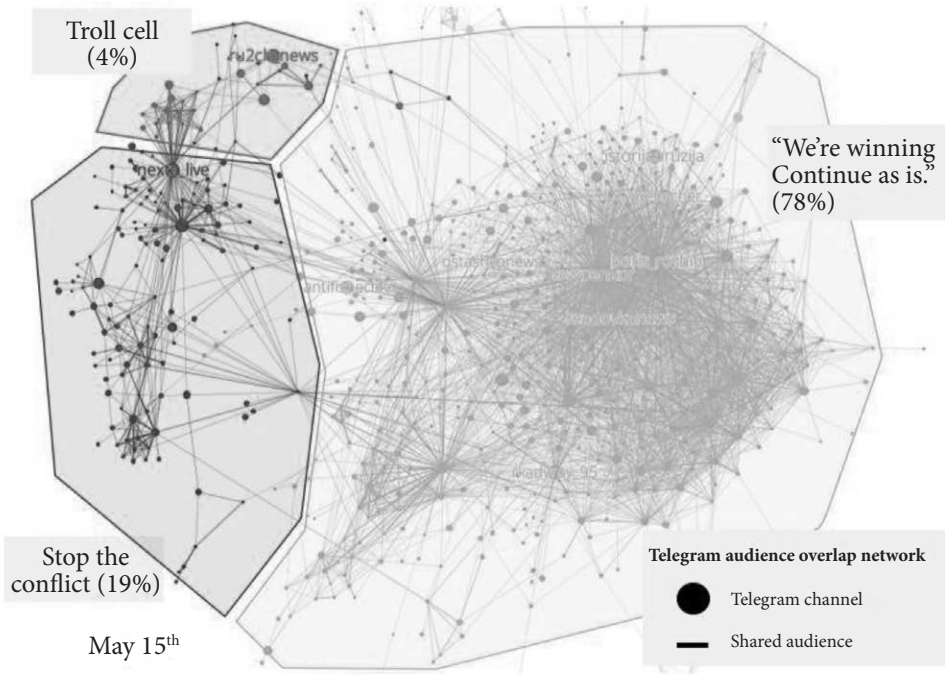

Fig. 2 Telegram audience overlap network of Russian Telegram channels featuring conversations on the conflict in Ukraine, classified by the sentiment towards conflict.

Media Ecology in Wartime: Case of Ukraine

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Introduction. The importance of information is determined by its influence on decision-making. Both traditional and new media are established channels of information dissemination. Media content covers all aspects of a person's relationship with society and its subsystems, all areas of social relations in which a person is included. Traditional media remain an important source of information and their content is accessible to the majority of citizens, while they have ceased to be the only source of information. New media are inherently interactive, as the information consumer has the ability to add, edit or create fundamentally new personalized content. During Ukraine's military confrontation against russia's armed aggression, the importance of the media as a provider of reliable information and the formation of the media environment increases many times. At such a time, the civilian population becomes very dependent and vulnerable to the disseminated information and the created information environment. Journalists, bloggers, politicians, and public figures who create information content should be aware that releasing information into the public sphere automatically starts an information chain. This connection explains the phenomenon of "media ecology", that is, the influence of events in society on the psyche and behavior of an individual through media channels and media technologies.

Method of investigation. The complexity of the researched issue of media ecology in wartime refers to the interdisciplinary field of knowledge in social ecology, media sciences, political science, international relations about the problems of human interaction and the information environment of his life. This determines the methodological basis of the research, which is based on the principles of objectivity, multifactoriality and systematicity. Therefore, for the study of the phenomenon of media ecology during military operations, using the example of russia's armed aggression against Ukraine, the most justified method is, first of all, the interdisciplinary method of discourse analysis, because it allows to answer the following questions: "what pressure tools russia uses against Ukraine, how media content affects the civilian population, how has Ukraine's informational response to russian influence changed after the occupation of part of Donbas and after a full-scale invasion, how can be evaluated the effectiveness of information policy during military operations and what threats to the population may arise from the information content of traditional and modern media in wartime?"

The study of media ecology in wartime was conducted using a systemic approach and its component as a political analysis, which gave a holistic view of the information policy of

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the countries participating in the armed conflict. The historical method made it possible to assess the evolution of russia's communication strategy and tactics during military conflicts. The comparative method made it possible to compare the tactics of Ukraine after the first (2014) and second stage (2022) of russian aggression. Using the method of media monitoring and content analysis, messages from Ukrainian traditional and modern media were studied, which made it possible to determine key messages and their impact on the consciousness of citizens and interpret the behavior of the population during russia's military operations in Ukraine.

The empirical basis of the work was the basic works of Marshall McLuhan [1-2] and Neil Postman [3] on the basis of the influence of media content and information on the world view and human behavior, official documents, research of the "Media Detector" group and sociological studies of the Rating group [5, 9], as well as statistical data of the Office of the United Nations High Commissioner for Refugees [6, 8].

Investigation Results. In modern international relations, there are only four instruments of influence of countries, namely political, economic, military and informational. russia actively uses all these tools in its relations with Ukraine. Thus, an example of the use of russia's political influence on Ukraine is considered, in particular, Ukraine's involvement in the CIS, as an attempt to return it to russia's sphere of influence. The condition of concluding the "Treaty between Ukraine and the russian federation on friendship, cooperation and partnership" was the presence of the Black Sea Fleet of russia on the territory of Ukraine. The Orange Revolution of 2004 is considered to be Russia's direct political pressure on Ukraine with powerful information support, as the main struggle for the presidency was between the pro-russian candidate Viktor Yanukovych and the pro-Western Viktor Yushchenko. Similarly, the Revolution of Dignity of 2014 was caused by the unwillingness of Viktor Yanukovych to continue the European integration foreign policy course and the refusal to sign the Association Agreement with the EU. The apogee of information support for political pressure was Putin's video address on February 21, 2022 regarding the events in Ukraine and rusia's recognition of the independence of the self-proclaimed "DPR" and "LPR" on the same day. After the start of the full-scale invasion, Ukraine terminated diplomatic relations with russia.

Attempts to involve Ukraine in the Single Economic Space, as well as gas and trade wars, can be considered as economic pressure of russia. Information coverage of gas wars organized by russia in European countries is illustrative. It is known that "since 2005, russian Gazprom has hired communication agencies that deliberately and systematically discredited Ukraine in order to convince Europe that it (Ukraine) is an unreliable transitor" [4]. It can be stated that this information policy of russia was generally successful, it succeeded in discrediting Ukraine in the eyes of European consumers, gas pipelines were built to bypass the Ukrainian gas network ("Northern Stream", "Turkish Stream", technically ready "Northern Stream-2").

Characterizing the military component of russia's influence against Ukraine, it is necessary to mention the pressure exerted by russia to give up nuclear weapons, which resulted in the Budapest Memorandum. russia's powerful anti-Ukrainian information campaign contributed to Ukraine's refusal to join the NATO Membership Action Plan in 2008. After these events, russia moved to the physical use of weapons against Ukraine, annexing Crimea in 2014 and occupying part of eastern Ukraine. In 2018, there was a military provocation against

Ukrainian ships in the Kerch Strait, and in 2022, a full-scale armed aggression. Moreover, the main ideological explanation of the reasons for russia's invasion of the territory of a sovereign neighboring state, which was actively broadcast in the russian information field, was "the liberation of the population from the nationalist government and the spread of true moral values, the only bearer of which is russia."

Information as a tool of influence by russia was constantly used after Ukraine gained independence. Thus, available sources of information and their content determine the attitude and interpretation of important social and political events by citizens of Ukraine, especially residents of the East. An all-Ukrainian public opinion poll conducted in 2019 showed that "there is still no noticeable consensus among the public on issues that are important for Ukraine" [5]. For example, in the basic question of responsibility for the occupation of the East in general, the share of those who believe that the separatists and russia started the war first in Ukraine decreased (from 52% to 48.5%). The top TV channels of Ukraine play a direct role in the formation of attitudes and interpretation of events. Studies prove a direct connection between the editorial policy of the TV channel and the political position of its owner.

To the aforementioned traditional factors of russia's pressure on Ukraine during armed aggression, one more was added - humanitarian pressure. Evidence of this is russia's actions regarding the export of Ukrainian grain, oil, and metal products, as well as the forced deportation of Ukrainian citizens and children. Thus, according to official UN data, as of June 13, 2022, 1,188,807 people [6] were deported from Ukraine to russia, including more than 200,000 children.

Information response of Ukraine in 2014-22. Aware of the urgency of achieving the widest possible availability of nationwide Ukrainian TV channels in the east of the country and neutralizing the russian media presence, in fulfillment of the President's mandate, the National Council of TV and radio started radio broadcasting to the city of Donetsk in 2014-15, and resumed the broadcasting of "russian Radio - Ukraine" programs in Luhansk and Donetsk, the restored Donetsk regional state television and radio company was launched in Kramatorsk, which transmitted the materials of "Public TV of Donbas", the "Radio Ukraine International", as well as the content of "Radio Liberty" and Deutsche Welle. Since 2014, the national information space of Ukraine has been banned from rebroadcasting more than 70 russian television channels. An action to improve the media ecology of the domestic information space was the suspension of broadcasting in February 2021 of three informational TV channels "112 Ukraine", ZIK and Newsone. The influence of these channels consisted in the fact that they produced a large amount of exclusive pro-russian content, which was then distributed through various channels: in Telegram channels, local Facebook groups, regional mass media. There were local editions in the regions, which were almost completely filled with content copied from the websites of these TV channels. Media monitoring showed that the main narratives spread by these channels were the statement that "no one attacked Ukraine, there is a civil war going on here, in which Ukraine is to blame, we just need to take it and start making friends with russia, Crimea left by itself, because Ukraine didn't like him, there was an armed coup on the Maidan, etc. [7].

Informational response of Ukraine after the start of full-scale aggression in 2022. After the full-scale invasion, the policy of "one voice" became a mandatory component of the

Ukrainian media ecology. On March 20, 2022, President Volodymyr Zelenskyi signed a decree on a unified information policy under wartime conditions. Ukraine's information response after russia's full-scale invasion was the "single news" marathon, launched on February 24, 2022 with the aim of informing the population about the situation in Ukraine, launched within the framework of a single information platform of strategic communication on the basis of leading informational TV channels. A similar project was launched on the radio. As for the latest media, the websites and pages of government bodies in social networks are regularly updated here. Since the first day, the president has recorded daily addresses to the Ukrainian people, a fixed circle of advisers who communicate with the press has been determined. The daily broadcasts of the adviser to the head of the president's office Oleksiy Arestovich with the russian human rights defender Mark Feygin are very popular. The Disinformation Counteraction Center at the National Security and Defense Council of Ukraine is actively working, which daily debunks false information, exposes the media and journalists who spread fakes. During the war, the activity of 11 pro-russian political parties, which demonstratively supported and popularized russia's aggressive anti-Ukrainian policy, was banned.

The influence of media information on the behavior of citizens during the war in Ukraine. The media, journalists, and the blogosphere have become the third party in the russian-Ukrainian armed conflict. According to updated UN data, as of July 5, 8.8 million people left Ukraine since the beginning of the war [8], and another 8 million became internally displaced persons. It is important to understand that one of the components of decision-making was information received either through traditional or new media. Another aspect of the influence of media content, which is not sufficiently covered, but has very serious consequences, is the case of spreading information about the addresses of destruction, the placement of block posts, military units or the movement of troops, when a person unknowingly generates content in favor of the aggressor country, causing casualties among both the civilian population and the military. From this follows a very important law of media content during military operations - "do no harm".

As a result, media ecology and media content determine the effectiveness of the state policy of Ukraine on the external and internal dimensions. If in 2021 Zelenskyi's rating began to fall and at the beginning of the war was only 24.6%, then after the russian attack, Zelenskyi, remaining in Kyiv, turned into the leader of a struggling nation, to whom the attention of the whole world turned out to be. Sociological polls show that the level of support for the president is now 91%, and 92% of Ukrainians believe that Ukraine will be able to overcome russia's attack [9].

Conclusions. The occupation of Eastern Ukraine, the annexation of Crimea, and later the full-scale military invasion of russia into Ukraine was not limited to the seizure of territory, there was also the seizure and destruction of infrastructure, and what is most vulnerable is the threat of occupation of consciousness. The factor of media ecology, that is, the ability of media content to influence a person's consciousness and behavior, to shape his moral spirit, and desire for victory, is becoming especially relevant. The information component accompanies every factor of influence of states in international relations – political, economic, military and humanitarian.

Through media content, there is mutual influence at the level of "the public - decision-makers", when the media determines the behavior and attitude of the public, which in turn influences

the decision-makers, and the military-political leadership of the country through the media influences the behavior and moral spirit of citizens. Under such conditions, the role of media content is characterized by the "do no harm" phenomenon, since the vulnerability of the population as a target audience increases significantly in the conditions of a military conflict.

At the first stage of russian aggression, after the annexation of Crimea and the occupation of eastern Ukraine, Ukraine's information policy was focused on restoring broadcasting in the occupied and bordering Ukrainian territories, forming and delivering Ukrainian positioned content to the residents of these regions. Special attention was paid to the physical restoration of the destroyed media infrastructure. Since the beginning of the full-scale war, the Ukrainian president's team has demonstrated stability and consolidation, which made it possible to secure support both from the West and nationally. A major role was played by the coordinated information strategy of the president's office, when positioned media content turned into a functional element of combat operations and countermeasures against destructive russian and pro-russian information content. Therefore, the media ecology of the information field in the conditions of russia's full-scale armed aggression against Ukraine has become an additional tool for achieving military and political goals.

Keywords: *media-ecology, russian occupation, full-scale invasion, information tactics, information response.*

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Protection of Cultural Heritage in an Armed Conflict. What Poland Can Learn from Ukraine?

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Introduction. War in Ukraine has highlighted problems related to protection of cultural heritage in a modern armed conflict. Ukrainians have not only to defend their country, but also to protect their cultural heritage important to the identity of this nation. A key element of national power is the morale of its nation, which is embedded in its culture, historical experience and social structure. As Ukrainian defence showed cultural heritage may facilitate, in the event of a threat or armed conflict, mobilization of the society to a given, strictly conditioned situation (resistance). Thus, perceiving relations in the international arena as a struggle, one need to consider cultural heritage as potential targets of influence or destruction. The contemporary armed conflict is becoming more and more multidimensional and complex, thus requiring an interdisciplinary approach to the analysis of the phenomena occurring in it. As a consequence, it led to the emergence of new types of threats a deliberate destruction of cultural heritage.

The article tries to assess lessons learned by Ukraine in protecting its cultural heritage against Russian deliberate destruction. It describes the nature of threats posed by Russian aggression to Ukrainian cultural heritage and damage to cultural property. Finally, the article aims at highlighting consequences of Russian targeted destruction of Ukrainian cultural heritage. This assessment serves as a stepping stone for a discussion on challenges to the protection of cultural heritage during a potential armed conflict in Central and Eastern Europe. Drawing from practical examples of Ukraine, a preliminary threat assessment for Polish cultural heritage is offered. Based on that some proposals for improving protection of cultural heritage in Poland are formulated.

Method of investigation. The aim of the article is to look at protection of cultural heritage during a contemporary armed conflict in an interdisciplinary way. The research used the method of document research as well as quantitative and qualitative analysis. A review of the scientific literature on the current complex problem of legal and real life problems and challenges related to the protection of cultural heritage in war conditions. Protection of cultural heritage is viewed as an important element of the cultural policy of a given state and the activities of the international community. Publicly available information provided by Ukrainian and Polish governments as well as that of international institutions was used to reinforce evidence and present tangible date on protection of cultural heritage during an armed conflict.

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Investigation Results. The purpose of the invasion of Russia is not only to destroy Ukraine's critical and military infrastructure, but also to destroy Ukrainian memory and identity. Thus, Ukrainian cultural heritage sites, especially religious buildings, memorial complexes, monuments, museums, reserves, theaters and libraries have become the targets of influence and targets for destruction. This is indicated by the massive shelling, which is an indisputable sign of the war crimes committed by Russia against the Ukrainian nation and its cultural heritage.

The introduction of numerous legal regulations, based mainly on the activities of a specialized organization of the United Nations - UNESCO, in order to limit the destruction of the most valuable cultural monuments during an armed conflict did not contribute to ensuring safety against potential damage by the aggressor. The current Russian military aggression in Ukraine are another extremely drastic example of such a situation. The devastation of the country is not limited to critical infrastructure. On the contrary, the sites of national heritage are the victims of a carefully planned action aimed at depriving the inhabitants of Ukraine of key elements of their national identity.

Lessons learned by Ukraine in protecting its cultural heritage against Russian aggression are invaluable for the countries of Central and Eastern Europe. Poland and other countries in the region may improve their threat assessment to cultural heritage and introduce additional means that increase resilience of their cultural heritage to deliberate destruction by Russia.

Conclusions. The challenges to effective protection of the cultural heritage of a given nation (state), as evidenced by the current conflict in Ukraine, forces further improvement of the law and the creation of international, national and non-governmental organizations whose task will be to prepare the protection of cultural goods during conflicts. The most appropriate approach to the protection of cultural heritage is, in addition to drawing up plans for the sequence of decisions made and the reactions of designated persons, close cooperation with the local community. Research shows that without sufficient involvement of the local community, the protection of cultural heritage often turns out to be fruitless. Improvements to protection of cultural heritage based on the local community should take into account the development of methods to increase social awareness of damage to cultural heritage and the promotion and development of new forms of risk management not only among people responsible for cultural heritage.

Limitations. The results of the research show that despite many years of attempts to amend the law on the protection of cultural heritage, priceless objects are still damaged many times for a given society. Moreover, the current protection procedures based on the system of international law are insufficient.

Actions for the protection of cultural heritage should include systematic awareness of decision-makers on the need to develop alternative evacuation procedures and recovery of goods stolen by the aggressor. The ineffectiveness of the currently implemented protection measures forces the creation of alternative local organizations, specialized in the protection of cultural goods.

Acknowledgements.

Keywords: *cultural heritage; protection of cultural heritage; Ukraine; war; Poland.*

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Susceptibility to Disinformation in Poland. The Case of Instrumentalised Migration from Belarus in 2021

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Introduction. The aggression of the Russian Federation on Ukraine in 2022 was preceded by many hybrid attacks aimed at numerous countries in Europe, including Poland. An extremely important element of a hybrid attack are disinformation and propaganda activities. Unlike traditional conflict, it usually proceeds without an official "notice" to allow the aggressor evading responsibility. The Academic Center for Strategic Communication at the War StudiesUniversity in Warszaw, Poland has been investigating Russian disinformation under a media campaign #Fejkoodporni. The aim of the article is to interpret the results of research on the vulnerability of Poles to disinformation depending on how far we are from the place where the inflammatory events take place. The research focused on reactions of Polish society to misinformation on illegal migration to Poland from Belarus in 2021. It covered perceptions of Poles living in parts of Podlaskie and Lubelskie voivodships bordering Belarus and in other statistically selected regions of Poland.

Method of investigation. The research was conducted on 6-10 December 2021 using the diagnostic survey method using two research techniques: the survey technique and the interview technique. For research purposes, two research tools were created: a survey questionnaire entitled "Research on media reception in the context of the situation on the Polish-Belarusian border" (21 questions) and an in-depth interview using the telephone method (5 questions). The questions concerned several areas: knowledge and assessment of the credibility of information about the situation on the Polish-Belarusian border, knowledge of sources of information about Poland and the world, knowledge of how to deal with fake news, the visibility of the activities of services on the Polish-Belarusian border, assessment of the activities of the Polish Army on the border Polish-Belarusian, factors influencing the assessment of the activities of the Polish Army, assessment of the likelihood of threats.

Investigation Results. The study included two representative groups. The first group consisted of residents of towns in the vicinity of the Polish Belarussian border, in which the state of emergency was introduced. The second group was a representative group of residents of the rest of the country. In research, the Internet stood out as the first source of information. There were also significant differences between the border region and the rest of the country. The indications for obtaining information from the Internet were significantly greater in the border region than in the rest of the country. This may indicate that when one is personally

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involved in a given case, then he/she actively searches for information that is of interests, without waiting for a media message, which one can only be a passive recipient of.

Conclusions. Disinformation is one of the most serious threats to modern society. Along with the speed of spreading information with the help of the Internet, the possibility of its manipulation, modification and, consequently, creation of false messages has increased significantly. The instrumentalised migration that caused a crisis at Polish-Belarussian border in 2021 proved the case.

The research results showed that being in the vicinity of a place / region in a crisis situation, despite the apparent availability of first-hand information, increases susceptibility to disinformation. Therefore, a lot of emphasis should be placed on an efficient communication policy, directed primarily at residents most exposed to disinformation, i.e. those who are in the immediate vicinity of inflammatory events. In turn, the high activity of the Polish Army translated into a high level of acceptance of the presence of the Polish Armed Forces in the border area. The results of the survey show that each subsequent situation of a nature similar to the current crisis must be accompanied by intensive information activities. The thesis about the key importance of the Internet as the primary source of information for a large group of society was also maintained. A disturbing observation of the research results is the statement that Poles, regardless of the distance from the inflammatory zone, do not feel the need to fight fake news. Even when misinformation is found, most do nothing to deal with it.

Limitations. It should be remembered that only a conscious society and its critical approach to newly heard "news" while effectively checking the sources of that news and the credibility of the content, constitute a powerful step in discovering and spreading the truth. Therefore, further regular research into fake news is necessary.

Acknowledgements. The presented research was commissioned by the Academic Center for Strategic Communication (ACKS) at the War Study University in Warsaw, Poland and was aimed at examining susceptibility to disinformation depending on how far we are from the place where the inflammatory events take place. The author would like to thank the ACKS team for the opportunity to participate in the creation of research tools and work on the development of the collected research material.

Keywords: *fake news, instrumentalised migration, credibility of information, Polish Armed Forces, 2021, Polish Belarussian border.*

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Controlling in the MOD in the Context of Long-Term Stable Financing of the Czech Armed Forces and its Modernization

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Introduction. In the program statement, (https://www.vlada.cz/cz/programove-prohlaseni-vlady-193547/#obrana) the government's commitment is stated:"...increase the country's defense spending to the level of 2% of GDP in the 2025 budget. We will push for the legislative anchoring of this level of defense spending as a minimum." In connection with the development of the security situation in Ukraine, there is a dynamic increase in the budget of the Ministry of Defense of the Czech Republic in the history of the Czech Republic. For the period 2022 - 2025, there will be the increase from CZK 89 billion in 2022 to CZK 150 billion in 2025, which is this increase of 59%. As a rule, the Parliament of the Czech Republic reduced the MoD budget every year. In 2014, budget of the MOD was the lowest level (0.96% of GDP). According to commitment to NATO of the Czech Republic the government declares another commitment "... to submit a legislative proposal for a system of long-term stable and effective financing of the Czech Armed Forces (CAF) and its modernization in the form of a "defense fund".

With a limited number of employees involved in the planning, allocation, consumption and accounting of funds, the purchasing and property management, managers of professional departments will have to ensure efficient, economical and effective use of resources. Among the well-known resource management tools is controlling. In 2014, the economic department of the MoD implemented cost controlling in practice. Controlling provides monitoring and evaluating the costs of the cost centers of the CAF. The subject of the research is to determine the ability of controlling to relevant information for stable and effective financing of the CAF, including its modernization.

Method of investigation. As part of specific research, we created a small research team. Its members are students of the 3rd year of the financial resource management. The aim of the research is to recommend the direction of development of controlling.

To fulfill the research goal, the team is currently preparing documents for the analysis of the effectiveness of controlling. This analysis will become part of the SWOT analysis with the recommendation of a suitable strategy, which the team will present to the Economic Section of the MOD as a basis for the decision on the construction of controlling. The results of the SWOT analysis should be ready by April 2023 at the latest. The secondary output is

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to teach students the practical use of selected methods for decision support and research methods (e.g. questionnaire survey, statistical methods). Among the expected outputs will be professional articles by students, diploma (dissertation) theses and a professional internship at selected MoD workplaces.

Investigation Results. The obligation to implement controlling into Ministries do not result exhaustively from any Act. Every leader of an organization must take care of entrusted property with the care of a proper householder (Civil Code). Every head of an organization has an obligation to ensure economical, efficient and effective performance of public administration (Financial Control Act). For this purpose, the manager should take appropriate measures and tools. The team identified the fact that controlling is not implemented in government departments, except for the Ministry of Defense. The Ministry of Finance ended the reporting project in 2022. The last update of the so-called key analytical indicators for government departments (wage demand, property and operating costs) took place in 2015. At the same time, the research team maps the situation abroad. Our team will focus on controlling at the MOD of Germany and Slovakia or the so-called RAB system at the MOD of Great Britain. Furthermore, the research team started an analysis on the market of available and offered information systems for controlling in public administration.

Conclusions. The research team is based on the results of correlation analyzes, which proved that a higher volume of the final budget increases the risk of a higher volume of unused budget resources, for example in the acquisition process. Setting up new control procedures can greatly reduce this risk. At this stage of the solution, the team concluded that neither the government nor departments outside the Ministry of Defense were looking at controlling as a tool that could reduce spending inefficiencies and deliver savings. The MOD has established cost controlling, but with limited options to ensure effective allocation of resources. The good practice examples of the Ministry of Defense of Germany, Great Britain, Slovakia, and the USA seem inspiring.

Limitations. However, research using limited opened sources and data only. Students have no experience in the practical use of controlling in a civil or public organization. They can only work with publicly available information and data. When working with the financial information system, they will use adjusted (model data).

Acknowledgements. This work was conducted within the framework of the scientific project "Development of Construction of controlling in the defense sector in the context of long-term stable financing of the army and its modernization" Faculty of Military Leadership.

Keywords: *controlling; financial management; budget; cost; modernisation; cost alocation; SWOT analysis.*

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Systemic Corruption as a Threat to National Security - Protection of Civil Servants Who Report Breaches of European Union law in the Czech Republic

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Introduction. DIRECTIVE (EU) 2019/1937 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2019 on the Protection of Persons Who Report Breaches of Union law had deadline for transpositions into their national laws within EU member states until 17 December 2021. Czech Republic failed to fulfil this duty until now (July 2022). In some cases, therefore, the Directive is directly applicable in the Czech Republic. It was unclear to the author of this paper whether the Directive is directly applicable in current court proceedings concerning cases that actually began before 17 December 2021 (whistleblowing took place before this date). In the Czech Republic the first court opinion in this case was made in the proceeding before the Supreme Administrative Court under the reference number: 4 Ads 440/2021 - 105 of 28 June 2022. The Supreme Administrative Court states that it fully respects the necessity of whistleblower protection under Directive (EU) 2019/1937 of the European Parliament and of the Council of 23 October 2019 on the protection of persons who report breaches of Union law. In the present case, however, it is not apparent from the documents before the Court that the complainant was penalised for reporting breaches of Regulations (moreover, the complainant also changes the alleged cause of his sanction: while in the proceedings before the Municipal Court, he argued that there was an inaccuracy regarding the payment of compensation to persons posted to the EU institutions, in cassation proceedings alleges a notice of irregularities concerning implementation of relocation measures, thereby discrediting his own argument). Substantial is that the actually established disciplinary offences of the complainant could not have had any other consequence, than his dismissal from the service. Therefore, the Supreme Administrative Court considers that the defendant has demonstrated that the measure (here dismissal) is based on duly substantiated objective facts within the meaning of Article 21(2). Article 5(5) of the cited Directive.

Method of investigation. Unwanted and unplanned action research was provided by Mr. Aleš Pachmann, Ph.D. in the Czech Republic when was his civil service (he served as civil servant according to Act No. 234/2014 Coll. in one not closer specified Ministry) cancelled by decision of disciplinary commission of II. degree. He in all of related administrative and court proceedings claims that steps against him were based on retaliation proceeded by his whistleblowing activities

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Investigation Results. There is certain inequality between employees in the private sector, who may extend the grounds for invalidity of the termination of employment until the end the first hearing in the case (or until the expiry of the time limit set by the court), whereas employees in the public sphere it must succinctly define these grounds already in the context of the action or within the time limit for its submission.

Conclusions. dismissal from service is analogous to an administrative penalty and the current relevant case practices should apply.

Limitations. Limited amount of court cases on the topic in the Czech Republic

Keywords: *Whistleblower; Corruption; Court, Directive.*

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Security and Protection in Terms of the Assumptions of the Coalition Agreement for the Election Period 2021-2025

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Introduction. Based on results achieved in the elections to the Chamber of Deputies of the Parliament of the Czech Republic, which took place in October 2021, the priorities of the winning parties grouped into one government coalition were set. These priorities were presented in the form of a coalition agreement to the public. A paper deals with the anticipated intentions of the Government of the Czech Republic in its implementation for the 2021-2025 electoral period in the issues of safety and security in all aspects of their perception. Among the aspects examined were the areas of security policy implementation and the broader concept of population protection. In the paper, the terms "security" and "protection" are frequented in the number and form in which they appear in the text of the coalition agreement. The paper presents the occurrence of these terms in the documents that became the basic and initial documents for establishing mutual pre-election cooperation between political parties and movements. Last but not least, it also presents changes in the approach to these concepts in relation to coalition agreements concluded in 2013 and 2017. Other aspects of coalition agreements are deliberately not mentioned.

Method of investigation. The article discusses the approaches of individual political parties, movements and government coalitions to the electoral activities in the Czech Republic in 2021. The individual parties of the governing coalition presented their political programme separately and it was subsequently adapted into the framework of a coalition agreement of five political parties and movements. Approaches to the issue of security and protection of the population of the Czech Republic were compared.

Investigation Results. In the form of a table, the individual frequencies of occurrence of these key words are summarized. In the paper, the obtained results are discussed not only from the economic perspective, but also from the perspective of security and protection of the population. At the same time, it was compared and analysed to what extent the individual parties conceded their demands before the elections within the coalition negotiation process. It was also compared which parties of the ruling coalition are more and which are less concerned with the issue of security and protection of the population. The results of the

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analysis are compared with the programme statements of the government over the past 8 years of government of other political parties currently in political opposition.

Conclusions. The coalition agreement, which de facto unites the political interests of all parties participating in the government, represents a challenge that the people of the CR should not ignore. It can serve as a tool for the ongoing and final evaluation of the success or failure of the government. Based on personality, media or party evaluations, every citizen of the CR can, in four years, independently and in his or her own interest, develop his or her own view of the activities of the government coalition and make a very realistic decision as to whether or not to allow the continued activities and governmental involvement of this grouping.

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Keywords: *Czech Republic, government coalition, coalition agreement, security, protection, integrated rescue system.*

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Social Integration of Millennials Generation in the Lithuanian Armed Forces - What Challenges are Waiting for Organization to Retain Individuals in the Military Service?

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Introduction. Millennials currently are one of the largest members of the age cohorts performing military service among the world armies also in the armed forces of Lithuania. The expectations of Millennials individuals are far more individualistic compared to previous generations: generation X, baby boomers. Meanwhile, military service, traditionally, requires individuals to be much more involved, devoted to a collective goals. Compared to civilian professions, it is a *greedy*, *total* and more *socially isolated* profession. The vast majority of early military retirees belong to the category of junior officers (senior lieutenants and captains). The research (2018) made by Lithuanian armed forces military psychologists on early termination of service contracts shows that the main reason for the termination of professional military service soldiers' contracts is dissatisfaction with the fulfillment of individual needs by combining career and family expectations with military service (Balsys 2019). Researches show that millennials quit their jobs if the content of jobs do not meet their individual expectations. The question is- is it possible to successfully integrate modern individuals into a traditional, strictly hierarchical organization such as the military?

The aim of the research is to reveal the value features of the social integration of the millennium generation individuals (officers, non-commissioned officers) serving in the Lithuanian Armed Forces in the military service. The uniqueness and exclusivity of the study is that it reveals socio-cultural features of the aspects of values of the social integration of the millennial generation military men. These aspects are condition in nowadays military service for social inclusion of millennial generation individuals. The cultural aspects presented in the study allow us to consider the challenges facing the expectations of the millennial generation of individuals in military service, which will become an increasing challenge in the future. The empirical part of the article is based on the antagonistic values of social integration: presenting integrative aspects and disintegrating aspects. This method allows to consider not only the expectations of integration, but also social change and conflict that is met in the social integration of millennial soldiers in the armed forces of Lithuania.

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Methods of investigation. The research is done by qualitative research method using semi-structural interview approach. Informants of research – military officers, non-commissioned officers of the professional military service of the Lithuanian Armed Forces that are actively performing military service and military men that terminated their contracts prematurely (former soldiers that terminated military service earlier, until retirement age and chose civilian professions). A total of 22 informants were interviewed: 16 men, 6 women, of whom (16 officers, 6 non-commissioned officers) (3 officers (women), 3 non-commissioned officers (women), 3 non-commissioned officers and 13 officers) aged 27-42 (Service experience- at least 5 years). Military ranks - from corporal to major. Interview duration 41-95 min. (average 62 min.). The study audiences (active military personnel and former soldiers) are unique and allow for the validation of not only integrating factors but also disintegrating aspects. The informants were asked open-ended questions, which were divided into main blocks according to the topic (prestige of the profession, assessment of the factors of the military institute, social integration of the military profession in the organization and comparison of the military profession with civilian professions).

Results. Empirical data reveals the socio-cultural aspects that are characteristic for the social integration of a millennium generation individuals. The article extensively describes the antagonistic meanings (integrating and disintegrating) that define the cultural norms of today's millennial generation of individuals. These socio-cultural aspects are condition of social inclusion in the organization (or allienation): *self-realization- more important than career* versus *unfulfilled expectations in military service*, *individual expression* versus *restriction of individual expression*, *favorable conditions to create* versus *meaningless content of the service*. Looking through the prism of the structuration theory, these cultural features of the military service, which are characteristic of the representatives of the millennials, reveal the tendencies of cultural change in the armed forces of Lithuania.

Conclusions. This study shows what socio-cultural challenges are relevant talking about integration of nowadays individuals in the Lithuanian Armed Forces and that socio-cultural content of military service will be increasingly significant and relevant in the future. Successful integration of the millennial's generation individuals, the Z-generation are more demanding to the content of the military service and they will become increasingly relevant talking about successful inclusion of individuals. Millennium generation has high individual expectations (self-realization, individual expression, favorable environment to create) and are critical to what they perceive as meaninglessness of the military service routine, the restrictions of freedom, and the unfulfilled individual expectations. For millennials who come to serve, it is far more important that the place of service has the right conditions not only to contribution to the collective good, but also to be able to meet their individual expectations.

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The Russian World as an Ideology for Destroying Ukrainian National Identity

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Introduction. The attack on the national identity of Ukrainians is one of the manifestations of Russian aggression. Ukrainians are considered either as a political project imposed on the southwest part of the united Russian people by external hostile forces (Poles, Austrians, Germans), or as a degenerate variety of this people under the influence of hostile external and internal influences. The solution to the "Ukrainian issue" is possible, from the point of view of the Russian establishment, only through the integration of Ukrainians into "the Russian civilization". "The Russian civilization" is a state together with "the Russian world", which means a network of people and communities outside the Russian Federation (RF), which are somehow included into the Russian cultural and linguistic space. In a narrow sense, it is the Russian-speaking diaspora whose sociocultural needs must be taken care of by the relevant state authorities of the Russian Federation and public organizations created under the patronage of this state. In the broad sense, "the Russian world" is a set of political and cultural ideas through which the expansion of the Russian Federation is embodied, the promotion of the ideology of "the Russian world" as a transnational space for the spread of the Russian language and culture. The peculiarity of its application in Ukraine is the identification of people of Russian culture or "Russian speakers" with "Russian compatriots" regardless of their nationality. The Russian Federation regarded this category of Ukrainian citizens as a "legitimate" object of its guardianship and protection and hostilely perceived any attempts to spread the influence of Ukrainian culture on them, to expand the sphere of education conducted in the Ukrainian language.

"The Russian world" is the highest degree of statism and authoritarianism when the interests of the government and its leader are placed above the interests of the civil society, and personal loyalty to the leader and unquestioning service to the state are recognized as an ideal. It is also a political ideology in which democratic norms of social life are presented as imposed by the West, and the corresponding political practice based on the neglect of civil rights and freedoms, as well as the use of repression against dissenters. It is also a military doctrine that allows aggressive actions against sovereign states. "The Russian world", as an ideological concept, affirms the common Russian identity of all Eastern Slavs, defends the idea of their historical, cultural, and political unity. The main mythologemes are: 1) the memory of the past unity of Russia with the tradition of "collecting Russian lands together"; 2) identification of the current political space with the canonical territory of the Russian

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Orthodox Church; 3) Moscow-centrism; 4) recognition of Slavism as a spiritual community of peoples; 5) recognition of the Ukrainian identity as an artificially created identity.

'The Russian world' occupies a prominent place in the strategy of the 'revival of Russia' and its revenge in the post-Soviet space. This strategy contains the following basic principles: 1) "division of the Russian people" and their right to reunification; aggressive Russian messianism, which must be absolute for everyone, primarily for eastern Slavs; 2) the artificiality of post-Soviet state borders; 3) the need to protect "compatriots", including by force. Achieving the set goal involves solving the following main tasks: 1) initiation and public presentation of local patriotisms, which are components of the all-Russian project - Little Russia ideology, Ruthenism, pro-Russian ideology of Cossacks, Novorossia, etc.; 2) coercion into official recognition of the broad rights of the Russian population and the need to conduct a policy loyal to the Russian Federation within the states containing Russian population; 3) administrative and territorial unification of the "Russian land" in forms ranging from interstate unions to a single unitary state.

Putin's statements deny not only the legality of Ukraine's modern borders but also its existence as a sovereign state. Through aggression against Ukraine, the Russian Federation makes it clear to the world that historical precedents and historical events are recognized as the legitimizing factor of its military and political steps. Since there are millions of Russians / Russian speakers living in Ukraine, the Russian Federation considers it a duty to "protect" them, because it is the guarantor of the existence of "the Russian world".

Having launched a war against Ukraine, the Russian Federation is trying to achieve its goals not only through conventional armed forces, but also through the extensive use of disinformation. The war in Ukraine is a vivid example of the implementation of a practical concept, when disinformation diversions, fakes, simulacra, etc. are massively used. In addition to working in Ukraine, Russian propagandists actively operate in the European information space, claiming that the Russian Federation is not an aggressor but a defender of the Russian minority and Russian-speaking Ukrainians from "aggressive nationalists." Therefore, "the Russian world" is used as a tool of military aggression, information and propaganda attacks against Ukraine, a means of leveling Ukrainian identity, and a tool of domestic and foreign political influence. Now we are talking not only about the expansion of "the Russian world" onto the territory of Ukraine, its war against the Ukrainian state, and its Euro-Atlantic course, but also about the formation of a new type of interstate relations.

Keywords: *Russian world; ideology; Ukrainian national identity.*

Responding to Evolving Military Threat. Development of Polish Armed Forces After 2014.

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Introduction. The capability for national military defence, along with collective defence within NATO and the strategic partnership with the US, has remained a cornerstone of Polish defence policy for recent two decades. The changes in security environment stimulated the development of the Polish armed forces during that period. This applied to strategic concepts, as well as operational capabilities, organization and size of the armed forces. Initial plans for the development of the armed forces after Poland joined NATO called for reduction, technical modernization and focus on expeditionary operations. After 2015, as a reaction to the increased military threat resulting from the aggressive policy of the Russian Federation, Poland took significant efforts to develop capabilities needed for conventional defence, introduce new generations of weapon systems and increasing the number of troops, to include territorial defence. The pace of development between 2015 and 2022 sought a balance between new capabilities and resources available. Russian aggression against Ukraine in February 2022 added sense of urgency and influenced priorities, scope and pace of development of Poland's armed forces Poland's ambitious plans for development of its armed forces deserve a closer examination. Especially, coherence and adequacy of development of its armed forces as confronted with evolving security environment and military threats. The degree of implementation of the development plans and the sustainability of defence solutions adopted by Poland deserve closer insight as well.

Method of investigation. The research used critical analysis of official documents related to assessments of security environment and Polish Armed Forces development. The research was limited the period post 2014 and the planning horizon of 2037relies heavily one official governmental documents, statements and press releases. Earlier data served primarily for setting the stage for assessments related to the post-2014 period. Sources of the Ministry of Defence, the Supreme Auditing Office and the Parliamentary Committee for National Defence formed the basis for data presented in the article. The research tried to explore whether defence efforts, to include those tied to development of Polish Armed Forces after 2014, have been relevant to evolving military threat and whether defence solutions adopted then are sustainable.

Investigation Results. The study suggests that Russian aggression against Ukraine in 2014 served as a turning point in efforts aimed at Polish Armed Forces development. It reversed the trend of reduction of the size of the armed forces and resulted in a more balanced approach to military capabilities needed for expeditionary operations and conventional defence of

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the state territory. Despite ambitious modernization plans, lack of substantial achievements in development and modernization of Polish Armed Forces in previous decades, did not allow for effective and timely response to changed security environment caused by Russian aggression in 2014. Selective technical modernization resulted in acquisition of high tech weapon systems by Polish Armed Forces, but precluded fielding the numbers needed to defend against potent conventional adversary. A solid foundation was laid for territorial defence by creating a separate service and reinforcement of the special forces units.

Russian war against Ukraine started in February 2022 triggered accelerated efforts to introduce new weapon systems and increase capabilities for conventional defence of Poland. With more funds readily available, Poland decided to acquire several major weapon systems and increase the size of its armed forces. Plans for coming decade may see Polish Armed Forces armed with state of the art western weapon systems, optimized for high intensity conflict against state adversary. However, estimated costs of planned development of Polish Armed Forces seem too high to be sustained in the long term. Therefore, a kind of compromise between ambitious plans and fielded capabilities will be most likely needed to seek a right balance of capabilities to address evolving military threat.

Conclusions. Adaptation of military forces to evolving security environment pose several challenges. As development of military capabilities remain a lengthy and resource-consuming process, the adaptation tends to be somehow delayed and not fully relevant to the nature and scope of the changes to security environment. Perseverance and coherence of development efforts along with stable financing create another challenge. Efforts related to development of Polish Armed Forces after 2014 witnessed similar challenges. With a dramatic change of threat assessment resulting from Russian aggressive behaviour, there was a need for substantial changes to concepts of Polish Armed Forces development. Ambitious plans, curbed by limited resources available, slowed down modernization and development of Polish Armed Forces prior to February 2022. The sense of existential threat posed by Russian aggression against Ukraine resulted in increased financing for armed forces development. Depending on security environment developments, some of the development plans for Polish Armed Forces may not fully materialize and a kind of the middle of the road solutions may need to be adopted.

Limitations. Data used for this research has been extracted from publicly available governmental documents, news releases and statements. The research does not relate to any classified sources or any alleged leaks or speculations thereof.

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Keywords: *security environment, military threats, armed forces, Poland, 2014-s,*

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Military Organization's Role and Place in the Recent Russia (Russian Militocracy)

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Introduction. Today's Russian Federation is becoming a state with imperial ambitions and where the military organization influence is growing and dominating. Among clues explaining why this is happening is the fact that the Russian military remains a Prussian-type military. This type of military activity was forbidden by the Treaty of Versailles as 'an efficient military instrument' and abolished in a majority of countries after WWII. It appeared in the Russian in XVIII century and remains till today. Here, it was modified and indoctrinized to be active in politics and became a special type of the military. The topic will explore the problem of determining how different the Russian military is and what role it plays and what place it has in the Russian statehood.

Method of investigation. To find the answers to the questions above, an analysis of primary and secondary sources and the case study were used. The institutional characteristics of Prussian military culture (and its General Staff) were derivered from works of experts and historians decribing Prussian General Staf and military peculiarities. When comparing the findings with recent characteristics of Russian military and its General Staff service described in its normative documents or studies done by military experts in military institutions, the answer appeared, why one or another ‚modus of operandi' was chosen or what motivation and rational was behuind. And finally, to prove those characteristics that influence the activities of mlitary institutions and the success in establishing itself in the state, the case study based on the analysis of concrete projects, actions, and efforts was conducted.

Investigation results. Institutional characteristics. The Prussian (and recent Russian) military organization possesses some exceptional, conservative, and in some cases applicable only to itself characteristics. Among the most important ones is the conviction that the military in general and its elite (the General Staff) in particular are the best suited to solve the most complicated tasks by preparing (and implementing) the best quality solutions. A rejection of self-proclamation and identification following the motto „not to appear, but to be" (Morgan 1915) is another particularity. Acceptance, advocacy, and promotion of an existence of elites or castes is another difference compared to other militaries. Next to a simple division of officers into commanders and ordinary staff, the third category, the General Staff Servise (GSS), is introduced. The GSS separates its members from others by imposing special requirements and assigning exceptional privileges. Among those, the most important is the right ‚to disagree with the plans or orders of his commander and appeal to the highest commander directly"(Millotat, 1992). This type of military ignores any inherited merits and advoceste professionalism and devotion as the only criterios to be a member of the GSS. To prevent outsiders from infiltrating

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the GSS, the General Staff established a rule that only the elite itself decides who is fit and who is not to join ‚the club'. The selection of candidates to the GSS ranks is done by the GSS and the final training is done in the General Staff Academy (GSA). Special behavior requirements and (as a reward) privileges are mandatory to the elite. In recent Russia special extra requirements to the General Staff officer (dress code, working culture, etc) alongside the privileges and a special status is fixed in different documents including Russian Laws. This culture suggests the availability of key (commander) positions only for GSS officers. (CIA 2010).

The GSS ‚Modus of operando' could be described as seeking efficiency (and effect) by synchronizing all actions and activities and focusing only on results. A "Win-Win" case here is not acceptable, ‚you win or lose' lives here. To achieve a task, nothing could object the GSS work. While working (planning) and acting, the General Staff officer must follow only rules approved by the Staff. Other regulations, agreements, and laws should be considered, only then they contribute to the success. Morale, traditions, ethics, etc. apply and should be considered only as long as they contribute to the result. (Morgan. 1915). A recognition of importance of science and technologies is very esential and the General Staff tries to find the place for them to get a war more efficient. (Kuhl 1922), (Zioshovskij 2002). Differently from Prussians who recommended regional militaries to be apolitical Russian military organization on this matter is different. The Bolsheviks opened the door for the military to join politics. With a general opinion of proletarian war lasting forever, Russian (soviet) military became naturally destined to be a part of politics. Quite soon, the military accepted its involvement in political processes as normal thing. As a result, military methods and approaches used in war fighting became applicable and useful in all other areas of the statehood.

The respect the military organization gets from the Russian ruling elite is obvious. 'Russia has only two allies. They are her army and fleet", this Russian tsar Aleksandr III declaration serves as the best recognition of Russian military. The Bolsheviks also paid special tribute to the Red Army. Today, the military organization is on a rise of respect. The best example of this is a recent new generation (Hybrid) warfare concept, the so-called 'Gerasimov doctrine', which was developed by the militaries and implemented by the entire state. Centralization and unity of command could be taken more as belonging to the Russian military culture. It falls into a tradition of Russian rule where a tsar was the sole ruler. The last but not least particuliarity of Russian military organization is its size and shape. During the USSR times, the organization consisted of the ministries of Defense (MOD) and Interior Affairs (MIA) and the Commitee for the State Security (KGB). After the Soviet collapse, the military (the General Staff) kept thinking how to perform in a new political environment. Today the organization is much bigger, with other institutions like the Russian National Guard (Rusguard), (RNG), and even paramilitary forces joining it.

Military organization entering Russian elites in the new Russia

	National leadership	Government	Governors	Upper house	Lower house	Average
Gorbachev cohort 1988	5	5	–	5	4	4
Yel'tsin cohort 1993	33	11	2	3	6	11
Yel'tsin cohort 1999	46	22	5	7	7	17
Putin cohort 2002	58	33	10	15	9	25
Putin cohort January 2008	67	40	21	17	14	32

Source: (Kryshtanovskaya & White 2009).

Military organization in statehood (militocracy). Most of Putin's surroundings and he himself are from the military organization. The institution culture, values, and other characteristics are deeply rooted in their heads. They understand very well that those suit the totalitarian governing. In the USSR the military organization was not so visible, but deeply involved in everything. With the USSR broken the organization lost previous power, respect, social status, and perspectives. Since Putin a situation began to change. The return began with a military reform. It had to demonstrate the ability of the organization to transform itself and later to do the same with the state. It planned to play a leading role in state management by transferring its own management practices and cooperation procedures (C2 in the military language), personnel policies and the values and philosophy of other organizations to all state institutions and society. With thousands of militaries joining business and other areas and appointment and election representative from the military began also.

Next to people entering the state services and public bodies, the attitude of management of state began to change as well. With the idea of centralizing all military C2, at the end of 2014, with the establishment of the National Defense Management Center (NDMC), a process of military organization gaining levers to command and control the entire state excelled. The system kept expanding with established federal regional and governmental centers named as situational centers created. Military gains access to faith, culture, science, ideology, sports, and other areas. It became the biggest support for the Russian Provoslav Chuch (RPC). The military organization is already leading the geographical and historical elites, is involved and shows effectiveness in other areas as well. It has built a few dosens of medical centers during COVID in monhs. The education of young Russians is also taken care of. Since the last few years, specialized paramilitary schools - presidential cadet schools - have appeared everywhere and a paralimilary youth organization "the Young Army" was established. Sport became an instrument to promote both the organization and the prestige of the state. Sports activities are organized under the MOD sponsoring and two sports clubs that contribute a major number of athletes to the national Olympic team.

The military participates in the creation of a new elite. People belonging to the military organization and possessing its institutional characteristics are becoming a foundation for the new elite. In Russia we see *former* and *serving (active)* militaries entering into civilian positions and returning back to the military service. This started more than a decade ago as a way to solve problems and get things done. The military also participates in the creation of the new elite. Next to infiltrating active and retired organization numbers, the military helps to train a new generation of elite. In recent years there have been new projects designed to prepare Russian administrators and even politicians. The ‚Leaders of Russia' and ‚Leaders of Russia - Politics' projects are examples.

Conclusions. The Russian military organization represents a special type of military institution, which has Prusian General Staff mentality and characteristics alive in Russia. President Putin is a product of this military culture and knows how to use its potential to strengthen his powers and the state.

The Russian military organization was able to survive and now is supporting a conservative right-wing vision of imperial Russia's future. The organization is infiltrating its own members into elites and transfers its own values, culture, traditions, morals, and 'modus of operandi' with the task of making them Russian national characteristics.

The Russian military organization has already achieved a lot in transferring the Russian political system into a totalitarianism dominated by one social group (militaries) and represented by a member of it. It succeeded in getting the militocracy in Russia.

Limitation: This work represents only a part of analysis done in the early work of the doctoral dissertation on the role of military institution in the Russian political transition.

Keywords: *Military Institution, General Staff Service, Militocracy, Institutional Characteristics*

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Optimization of Arms Race Under Conflict and Uncertainty

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Introduction. The problem of arms race belongs to the sphere of multicriteria decision-making. This is due to the need to take into account a large number of factors when solving it. The works [1]-[4] are examples of relevant research in this direction. They use different mathematical approaches to remove uncertainty, but one of the key approaches is the analysis of Richardson's model [5].

Although this model was proposed in 1960, it is still of interest to modern researchers (for example, [6]-[8]). We examine Richardson's general model for the two states, including the components responsible for uncertainty.

Mathematical model of arms race. We will assume that the two countries spend a certain amount of money on arms $x_1(k)$ and $x_2(k)$ in the k-th year.

Let's introduce the notation of investment $u_1(k)$ and $u_2(k)$, and uncertainties $f_1(k)$ and $f_2(k)$, for each country, then the dynamics of arms costs is described by the equations:

$$\begin{cases} x_1(k+1) = (1-\gamma_1)x_1(k) + \alpha_2 x_2(k) + u_1(k) + f_1(k), \\ x_2(k+1) = (1-\gamma_2)x_2(k) + \alpha_1 x_1(k) + u_2(k) + f_2(k), k = \overline{0,N}. \\ x_1(0) = f_0^{(1)}, x_2(0) = f_0^{(2)}, \end{cases}$$

Here γ_i, α_i, $i = 1,2$ are scalar values.

We assume that the uncertainty vector $\tilde{f} = (f_0^{(1)}, f_0^{(2)}, f_1(0), \dots, f_1(N+1), f_2(0), \dots, f_2(N+1))$ belongs to a certain limited set G.

Investment values $u_i(k), i = 1,2;\ k = \overline{0,N}$ are selected as:

$$u_i(k) = \big(v_i(k), x(k)\big), i = 1,2; k = \overline{0,N},$$

where $x(k) = \begin{pmatrix} x_1(k) \\ x_2(k) \end{pmatrix}, v_i(k) = \begin{pmatrix} v_{i2}(k) \\ v_{i2}(k) \end{pmatrix}, i = 1,2;\ k = \overline{0,N}$. Here $v_{ij}(k), i,j = 1,2;\ k = \overline{0,N}.$

Assume that on $u_i(k), i = 1,2;\ k = \overline{1,N}$ restrictions are imposed:

$$G_i = \left\{ u_i : \sum_{k=0}^{N-1} \sup_{\tilde{f} \in G} u_i^2(k) \le \beta_i^2 \right\}, i = 1,2.$$

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Each country must choose to invest in the "optimal" way, without knowing the magnitude of the uncertainties and investments of another country.

We use a guaranteed approach to remove uncertainties. To do this, we introduce the criterion:

$$I_s(v_1, v_2) = \sup_{\tilde{f} \epsilon G} x_s(N), s = 1,2.$$

Definition. Nash's optimal strategies $\hat{u}_1(k) = (\hat{v}_1(k), x(k))$ I $\hat{u}_2(k) = (\hat{v}_2(k), x(k)), k = \overline{0,N}$, are found from the condition:

$$\min_{K_1} I_1(K_1, \hat{K}_2) = I_1(\hat{K}_1, \hat{K}_2),$$
$$\min_{K_2} I_2(\hat{K}_1, K_2) = I_2(\hat{K}_1, \hat{K}_2).$$

Conclusions. We formulated the problem of finding approximately optimal Nash strategies. The results of the algorithm of finding these strategies can be used as some recommendations for investments in the military arm.

Limitations. It should be noted that the results are more theoretical. Therefore, the effectiveness of the proposed algorithm for finding approximately optimal Nash strategies can be demonstrated by numerical examples.

Acknowledgments. The presented paper has been partially supported by the joint Ukrainian-Lithuanian R&D Project "Modeling the role of human potential to ensure the defense of the country in the face of modern threats" (Registration number 0122U002629).

Keywords: *multi-criteria decision making; mathematical modeling, of military expenditures; uncertainty.*

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A Practical Assessment of The Potential Public Health Consequences of Russian Military Aggression in Ukraine

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Introduction. War or armed conflict negatively impact all the aspect of the healthcare system, social life, health itself, and the environment. For decades, millions of people have been forced to flee because of devastating consequences on their life. This year UNHR announced that Russian invasion of Ukraine together with other military aggressions pushed a total of more than 100 million people to leave their homes [7]. War as a made-man public health problem [8] causes deterioration in health by affecting aspects of life on every life stage - from early childhood to adulthood. Concerning potential public health risks and consequences of war dramatically increased, because it helps to assess issues that may occur, especially predict the long-term ones, and make an evidence-based policy to prevent or, at least, mitigate them. Here, we call for action to advance public health interventions by incorporating our findings into policymaking processes.

Method of investigation. Primarily, possible consequences to the public health during the war analysis was performed based on the reports and publications (such as [1]-[3], etc) of the international organizations. They can be grouped into twelve categories (Fig. 1.). It should be noted, that we highlight not only the risk associated with physical and mental health but also such factors of the long-term impact of war on the environment and destruction in policymaking.

The initial implications on public health, due to russian military aggression are widely covered in the Ukrainian and world media. However, little attention has been paid to their scientific analysis so far, as the humanitarian crisis and military action hinder data collection (for, example ([4]-[5]). However, the assessment of the consequences for public health during the war is an important task, because based on the results of such research, different scenarios can be modelled and applicable mechanisms can be developed to counter future risks and mitigate public health deterioration for each of the proposed scenarios.

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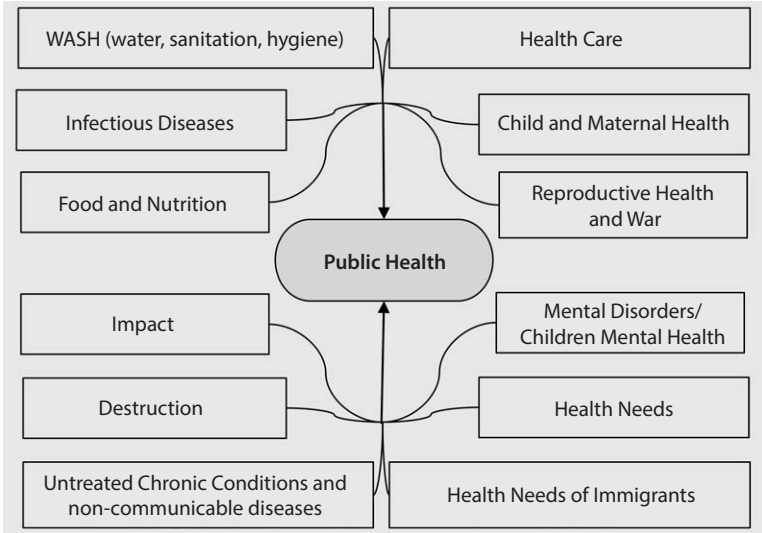

Fig. 1 Categories that can be affected due to war.

Investigation Results. Based on the literature review, 12 factors were identified as a consequence of war's impact on public health. A questionnaire, specifically designed for double-sided comparison DEMATEL Technique, covered these factors. Experts assessed the direct associations between influential factors in public health.

DEMATEL (Decision Making Trial and Evaluation Laboratory) was used in this study because it both ranks the factors according to their importance and causal relationships between them [6]. Due to the vagueness of human thoughts and language in decision-making, several studies presented the strength of using fuzzy variables in the assessments in the DEMATEL approach.

The framework of our research study is represented in Fig.2.

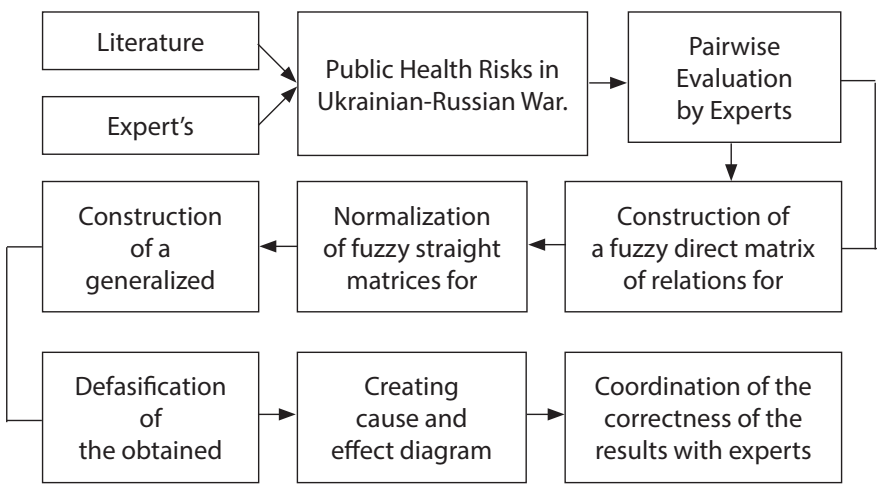

Fig. 2 Framework of our research study.

Conclusions. A literature review was conducted to formalize the basic consequences of a war on public health. These results were later used as input for the use of the fuzzy-DEMATEL method to assess causation among the effects of Russian military aggression on public health. The resulting cause and effect diagram can be used for policymaking and development of a plan for further complex research in this direction.

Limitations. It should be noted that the results are based on a generalization of expert opinions. Fuzzy linguistic variables allow the usage of many methods to work with expert opinions, but it is necessary to understand, that this entails standard difficulties in processing subjective expert judgments. Therefore, it makes sense to use the information on the dynamics of complaints about major illnesses and health problems in further research.

Acknowledgments. The presented paper has been partially supported by the joint Ukrainian-Lithuanian R&D Project "Modeling the role of human potential to ensure the defense of the country in the face of modern threats" (Registration number 0122U002629). The authors are thankful to partner organizations PATH and USAID, and also special thanks to Iurii Ganychenko, and Alexii Krapivka.

Keywords: *public health; multi-criteria decision making; fuzzy DEMATEL; Russian military aggression; Ukraine; war.*

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Time Pressure Influence on Criminal Decision-Making

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Introduction. The literature indicates that time pressure commonly causes reliance on intuitive, heuristic decision-making. Time pressure is also often linked with risky decisions. Meanwhile, a longer response time is associated with slow, analytical processes. This research examines the effects of time pressure on criminal decision-making.

Method of investigation. Repeated measures experimental design was used. Sample: males, who have committed a crime at least once in a lifetime (N=67, M_{age}=38.7 years, SD=9.6). All participants read financial crime (fraud) scenarios in three different time conditions (presence of unlimited time, time pressure and neutral). Following the scenarios, participants were presented a series of questions, including a decision to (or not to) commit a crime, motives, perceived risks of the decision, etc.

Investigation Results. Most participants, with and without time pressure, decided to commit the crime (70.15% and 59.7%, respectively). In all time conditions most participants predicted imprisonment if the decision to commit a crime was made. The benefit of the crime was the most frequently cited motive and it predicted the decision to commit the crime in all time conditions.

Factors related to the decision not to commit a crime differed across time conditions. The criminal nature of the activity was the dominating factor when deciding not to commit the crime under conditions of time pressure (55%), while in the presence of unlimited time expected negative consequences of the crime were cited the most (48.15%). The circumstances related to the crime were the most frequently cited motive for not committing a crime under neutral conditions (46.34%).

Regression analysis revealed that greater confidence in one's decision predicted refusal to commit a crime under time pressure. Meanwhile, a perceived higher probability of solving the crime predicted refusal to commit a crime under unlimited time conditions. A longer reasoning time and less than 5 previous convictions predicted refusal to commit a crime under neutral conditions.

Conclusions. The research shows that decision to engage in a criminal act, made under time pressure, is evaluated primarily in terms of the benefits of the crime, regardless of possible negative consequences or other factors. Under conditions of unlimited time, the decision

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process is supplemented by an assessment of possible negative consequences of the crime, which is linked with the decision not to commit the crime.

Limitations. Several limitations should be considered when interpreting the findings of the present study. First, given the small sample, it will be important for future studies to examine the predictions of criminal decisions and their factors with a more representative sample. Moreover, this study was limited by its use of hypothetical scenarios and hence more opportunistic and risky responses than may occur in real-life situations. Finally, it should be noted that this study did not take into account the emotional arousal experienced by the participants, which may have a significant impact on the decision-making process. Future studies may use questionnaires based on introspection or scenarios that trigger emotions to evaluate the influence of emotions on risk processing and choice.

Acknowledgements. The author is thankful for the collaboration provided by the administration of the Prison Department under the Ministry of Justice of the Republic of Lithuania and Vilnius Correction House, also for all participants of the research.

Keywords: *decision-making; time pressure; crime.*

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Theory of Chaos in Transport

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Introduction. The paper deals with the theoretical problems of nonlinear dynamical systems with internal parameters, which can be called chaotic systems with some simplification. The science of chaos has a relatively short history and is not yet sufficiently reflected by experts in various fields, resp. the authors are confused with the terms confusion, coincidence, etc. The authors believe that in examining chaos, it is necessary to consistently distinguish systems, namely deterministic, stochastic and chaotic.

Method of investigation. Chaos theory can find, somewhat surprisingly, application in such a purely technical and deterministic field as transport, resp. so far road transport and its very problematic part, namely traffic flows. Road transport is the efficient movement of means of transport in a transport network (a set of sections and nodes), the product of which is transport. The traffic flow can be understood as a purposeful relocation of a sequence of mobile means of transport, or pedestrians, etc. in the transport network. This can be done in various ways, from the classical Newtonian theory of gas flow, resp. fluids as a continuum, with consideration of force action and interaction of relations between them with the help of vector algebra through Hamiltonian approach, e.g. with canonical transformations and Hamilton-Jacobi equation, or Lagrange formalism.

Investigation Results. Movement of the vehicle in the column for the dependence speed, time and the movement space is shown in Fig. 1 [1], [4]. The relationship between the intensity and density of the traffic flow is shown in Fig. 2 [1], [4]. The relationship between speed and traffic flow density is shown in Fig. 3 [1], [4]. The relationship between the intensity and speed of the traffic flow is shown in Fig. 4 [1], [4]. The focus of applications for chaos theory in the area of traffic flows is primarily congestion in the road network.

There are several reasons, such as inadequacy (exceptional traffic density associated with globalization, the number of vehicles has multiplied in recent years, the number and capacity of roads is essentially the same as in 1990) or infrastructure overcrowding (congestion, motorways, border crossings, car parks, etc.), traffic accidents, vehicle failures, signaling equipment failures, shock waves, road maintenance and repairs, traffic congestion, inappropriate lane connections, emergencies, etc. This can be explained by the fact that vehicles do not move like gas or liquid, drivers try to avoid a traffic jam or collision by slowing down if they approach another vehicle, while gas or liquid does not behave this way. When the gas enters the constriction, the molecules accumulate, there is compression, which then propagates backwards like a shock wave.

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Comment:

Self-similarity is a property of an object or system that causes the object or system, at whatever scale, to still have the same shape or different characteristics. The dimension is in this case defined as $N = L^D$*, where N is the number of copies of the original shape at L-fold magnification of the linear dimension, eg the cube has dimension 3 (8=2³).*

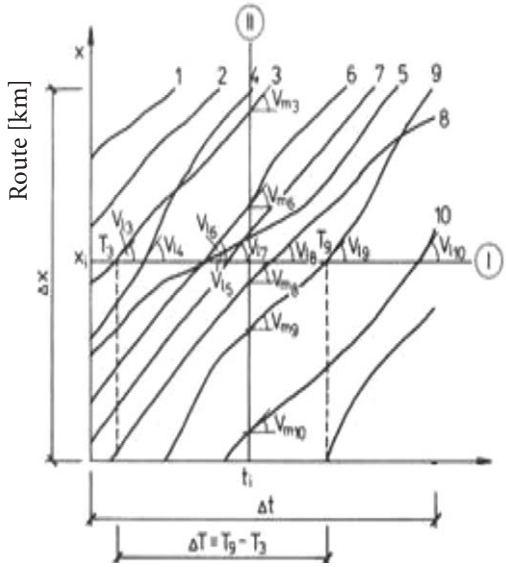

Fig. 1 Vehicle movement in a traffic convoy

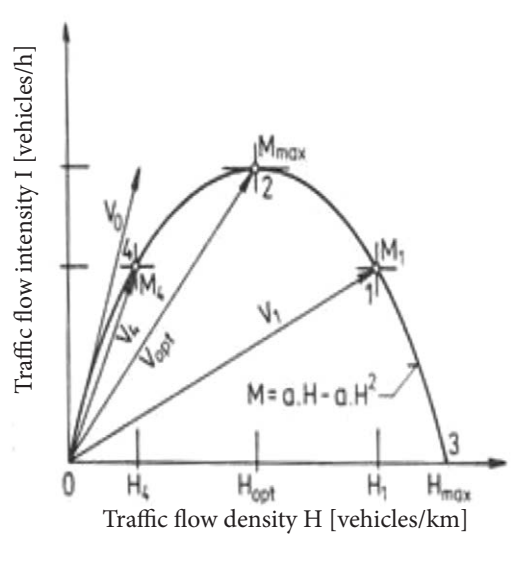

Fig. 2 Relationship between intensity and density traffic flow

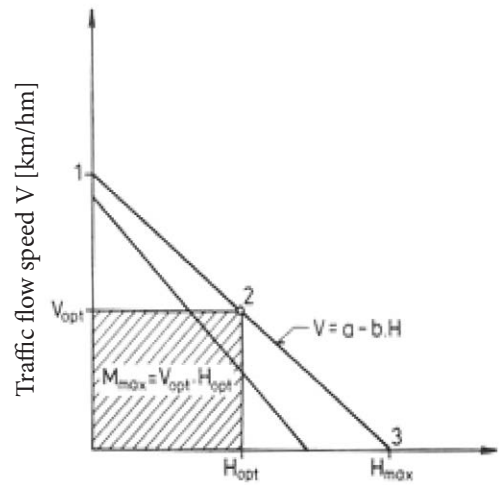

Fig. 3 Relationship between speed and density traffic flow

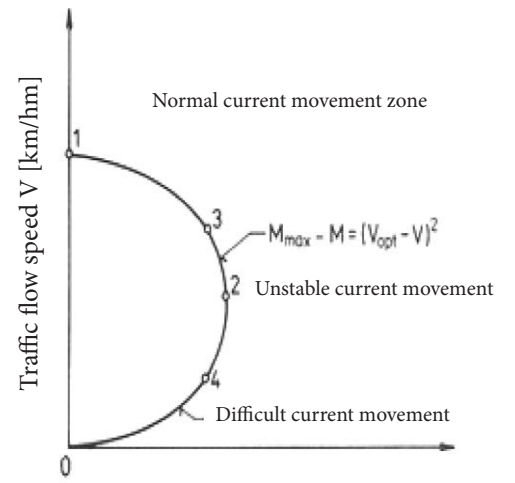

Fig. 4 Relationship between intensity and speed of traffic flow

Conclusions. Chaos theory is a complicated and in some respects controversial mathematical theory that seeks to explain the effect of seemingly insignificant factors. It is a relatively new scientific discipline that views the reality of the world and its laws in a completely different way from traditional sciences. For various reasons, it seems to be changing so far appreciated, because its name already arouses unwanted associations [12-16].

Analogous errors in computer modeling and simulation have historically occurred, for example, in the results of CFD (Computational Fluid Dynamic) models. Recently, it has become a standard for the use of a systems approach to the assessment of models, simulations, iterations, calculation and experiment results, which includes the possibilities of uncertainty management, credibility measurements, assessment validation (code verification) using experimental results (bench-mark) and built database.

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Keywords: *outcome, top event, gates, cut set, risk analysis, application.*

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Peculiarities of Construction and Analysis of a Complex Epidemiological Susceptible-Infected-Removed Model

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Introduction. Throughout its history, humanity has faced various diseases. Some were commonplace and did not carry great danger, such as the common cold we all have; others, in turn, were so deadly and rapid in distribution that struck millions. To be able to cope with such situations, you need to be able to anticipate different scenarios and respond accordingly.

One of the tools that allows you to do this is mathematical modeling [1 - 10], in particular, modifications of susceptible-infected-removed SIR models [11 - 14]. It allows you to project the dissemination of infection and the possible consequences of an epidemic. The importance of this knowledge when it comes to human health and life cannot be overestimated.

Such models use basic assumptions or statistics paired with mathematical approaches to calculate disease rate, mortality, and other parameters that describe the nature of epidemics. Knowing this information, you can develop a strategy to combat, and in the same way to test its effectiveness within the model. The effectiveness of such forecasts, in addition to the correct selection of data, also depends on taking into account all important factors and rules. The more details are built into the model, the more expressive and useful it will be. At a time when the Covid-19 epidemic is raging all over the world, the relevance of such research should not be in doubt. In the generalized epidemiological model studied in this work, we tried to take into account 11 possible states of people that are not taken into account in simpler versions of the model, for example, asymptomatic infected people, people in quarantine, people in the intensive care unit.

Method of investigation. Susceptible-Infected-Removed (SIR) is one of the simplest models

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used to mathematically model the dissemination of infectious diseases. In this model, the population is divided into three groups: susceptible to the disease (S – susceptible), (I – infectious) (R – recovered).

Susceptible and Infected persons have obvious interpretation. "Recovered" can have a wider concept. Consequently, we could say that R consists of those individuals who cannot no further fall ill, or which have recovered or have gone. The values of the groups depend on time, according to the order of the illness.

The differential equations of SIR model has a form:

$$\frac{dS}{dt} = -\frac{\alpha SI}{N} \tag{1}$$

$$\frac{dI}{dt} = \frac{\alpha SI}{N} - \beta I \tag{2}$$

$$\frac{dR}{dt} = \beta I \tag{3}$$

The SIR model in its initial form describes the simplest possible version of the spread of infection, so it is not always practical. For greater practicality, this basic model is refined to take into account as many different factors as possible.

The increments in infected individuals are determined by the product of the numbers of favorable and infected individuals. Here, α is the prevalence rate of the disease and is the recovery rate. The rate at which the number of infected individuals increases over time is related to the size of some event, which corresponds to infected and susceptible individuals being in close proximity to each other and interacting. The magnitude of this event appears to be proportional to the product of the number of susceptible individuals (*S*) and infected individuals (*I*). Apparently, the number of susceptible individuals decreases at the same rate as they cease to be susceptible and become infected.

Equation (1) shows that the number of susceptible individuals decreases with the growth of the infected. And since the rate of growth of the number of infected people is never zero, it turns out that the function is decreasing. Equation (2) shows that the rate of infection growth apparently increases as the number of infected increases and decreases as more individuals become infected. And equation (3) shows that the number of people who have recovered is directly proportional to the number of infected people. That is, *R(t)* is increasing.

Since the total number of persons must remain the same, an additional condition is imposed $S(t) + I(t) + R(t) = N$.

Investigation Results. The population is divided into 11 states and differential equations together with the presented considerations have the form:

$$\frac{dS}{dt} = -\alpha\frac{S(I + I_s + I_w + C)}{N} + gR \tag{4}$$

$$\frac{dE}{dt} = \alpha\frac{S(I + I_s + I_w + C)}{N} - \mu E \tag{5}$$

$$\frac{dI_s}{dt} = r(1 - s)\mu E - hI_s \tag{6}$$

$$\frac{dI}{dt} = rs\mu E - \varepsilon I + fC - \xi_1 I - \eta_1 I - \beta_5 I + hI_s \quad (7)$$

$$\frac{dI_w}{dt} = (1-r)\mu E - \xi_3 I_w - \eta_3 I_w - \beta_3 I_w - \lambda I_w \quad (8)$$

$$\frac{dQ}{dt} = \varepsilon I - \beta_1 Q - vQ - \rho Q - \xi_2 Q - \eta_2 Q + \lambda I_w \quad (9)$$

$$\frac{dQ'}{dt} = \rho Q - \beta_4 Q' - \xi_5 Q' - \eta_5 Q' \quad (10)$$

$$\frac{dC}{dt} = vQ - fC - \beta_2 C - \xi_4 C - \eta_4 C \quad (11)$$

$$\frac{dR}{dt} = \beta_1 Q + \beta_2 C + \beta_3 I_w + \beta_4 Q' + \beta_5 I - gR \quad (12)$$

$$\frac{dR_d}{dt} = \eta_1 I + \eta_2 Q + \eta_3 I_w + \eta_4 C + \eta_5 Q' \quad (13)$$

$$\frac{dD}{dt} = \xi_1 I + \xi_2 Q + \xi_3 I_w + \xi_4 C + \xi_5 Q' \quad (14)$$

Table 1. Parameters of the complex generalized SIR model.

Parameter	Value	Parameter	Value
N (total number of persons)	1.400.000.000	f (proportion of carriers who again get relapsed)	0.2
β_1 (rate of recovery)	0.5	α (disease spread rate)	0.53
β_2 (rate of recovery)	0.1458	h (the coefficient of deterioration of the condition of people who ignore the disease)	0.6
β_3 (rate of recovery)	0.1458	η_1 (rate of recovery of infected people with subsequent immobilization)	0.1
β_4 (rate of recovery)	0.05	η_2 (rate of recovery)	0.1
β_5 (rate of recovery)	0.09	η_3 (rate of recovery)	0.05
μ (coefficient of transition from group (E) to one of the infected states)	0.5	η_4 (rate of recovery)	0.01
v (the proportions of persons in quarantine who did not recover but left from quarantine (became carriers)	0.05	η_5 (rate of recovery)	0.1
ε (proportion of infected people who will be quarantined)	0.5	ξ_1 (mortality of infected people)	0.25
r (rate that determines what proportion of individuals when transitioning from the group (E) will be infected))	0.3	ξ_2 (rate of mortality)	0.2
g (rate of loss of immunity in recovered persons)	0.0001	ξ_3 (mortality of asymptomatic infected people)	0.1
ρ (the rate of worsening of the condition and transfer to intensive care)	0.01	ξ_4 (rate of mortality)	0.05
λ (proportion of infected people for next quarantine among people without symptoms)	0.025	ξ_5 (rate of mortality)	0.2
s (proportion of infected persons with symptoms who do not ignore them)	0.5		

Keywords: *generalized susceptible-infected-removed (SIR) model, epidemiological situation, conflict interaction.*

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A Preference Aggregation Model for Military Identity Dimensions by AHP-Group Decision Making

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Introduction. Aspects of military identity from a military sociological point of view have been expressed and examined in terms of normative orientations and terms such as culture, attitudes, values, and motivation, often following classical theories and concepts [1,2]. Furthermore, the military identity could be studied or analyzed by determining the extent to which soldiers or officers are motivated and willing to internalize the roles, the predominant goals, values, and tasks of the armed forces. Changes in Western culture have also complicated the formation and verification of identity, because in order to correctly describe the "I" of an individual, it is necessary to evaluate all the groups and organizations accessible to (attributable to) the individual, which complicates the study, because as the number of groups increases, so does the number of individual identities [3]. As you have already understood, as society and the armed forces change, it is very likely that this will also affect the military identity, which will inevitably change. Thus, in the study of the identity of the soldier, reasonable deviations could be seen given the historical relationship between social developments and trends in the armed forces of all countries. Therefore, in order to determine the measurable dimensions and constructions of Lithuania's military identity, the prevailing social trends should be taken into account. In addition, it should be kept in mind that Lithuania's military identity should in any case be seen as a multidimensional entity consisting of idealism, professionalism, militancy, and individualism. Therefore, the review of the literature allows us to conclude that for any army, the question is how to identify and understand the military identity dimensions and prioritize its specific characteristics that can help militaries develop the right competence directions throughout their career.

The gradual increase in defense budgets, the influence of public opinion, and the geopolitical context on the country's defense, all this influences today's armed forces and at the same time changes the identity of the soldier. Given that the problem is a multi-criteria problem, the AHP method was chosen. AHP is a multi-attribute decision-making technique developed by Thomas Saaty [4] to help users make complex decisions by combining their experience, judgment, and intuition to select the best course of action among many alternatives. The literature suggests that AHP is suitable for prioritizing various objectives such as economics, finance, politics, games and sports, conflict resolution, resource selection, and even everyday problem solving. This study focuses on the potential use of AHP to fill the gap of measurable dimensions and constructs in today's Lithuanian military identity. Furthermore, the identified dimensions were ranked according to the priorities assigned to them by experts

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in the pairwise comparison evaluation, using the Analytical Hierarchy Process (AHP) as a dynamic decision-making tool.

Method of investigation. Analytic Hierarchy Process (AHP) was used to reach the results of this study. AHP separates the decision-making problem into different hierarchical structures based on main goal, stratigraphic objectives, and evaluation criteria up to a specific preparation plan. This analysis helps to construct the evaluation matrix for each measurement level, obtain the priority weight of each alternative included in the study at each level, and finally, in this way, can be obtained the final weight for each dimension by using the weighted sum method [4].

According to the chosen AHP multicriteria decision-making method, the structure of this study consisted of four main phases. In the first phase, attention was focused on extensive previously published scientific literature to identify soldier identity traits that could be used to predict a soldier's psychological identity. The second stage focused on creating an evaluation structure for the specific criteria selected for the study, and the third stage focused on the evaluation of predefined criteria and sub-criteria taking into account the predetermined levels of each hierarchy. The evaluation of the criteria was carried out by invited experts who had to compare and rank the criteria according to the pairwise comparison method on which the AHP is based. Finally, the collected criteria evaluation data was analyzed and the results of the AHP model study are presented in the fourth stage.

Investigation Results. These investigations focused on the areas of Lithuanian military identity. The identity of the soldiers was evaluated using AHP. The multidimensional approach included four dimensions that described idealism, professionalism, warriorism, and individualism. In the end, the weights of each dimension are given. The observed results showed that professionalism (priority= 46.8%, rank =1) and warriorism (priority= 39.8%, rank =2) are the main characteristics of the identity of the soldiers, but despite the fact, the idealism that is important to improve the effectiveness of combat of the soldiers and can be an important motivating factor for the soldiers to join and remain within the Armed Forces was identified with the lowest priority (3.6%) and rank (4).

Conclusions. Our results revealed that the experts who participated in the study ranked professionalism as the most necessary characteristic of a soldier. Therefore, it can be said that professionalism is currently the most expected as the general identity of the army. One explanation could be that, according to the doctrine, the professionalism construct is actually very important to the army. In addition, the doctrine emphasizes the importance of conducting international operations, which further emphasizes the soldier's need to meet the elements of military service [5]. Experts rated individualism as a less important feature of a soldier's identity. This result is unexpected and more difficult to explain. Furthermore, the life situation of the experts who participated in this study may be different from that of young soldiers or officers, including family obligations, which may conflict with the demands of professionalism. Thus, the results of the research show that it is necessary to conduct additional research and study in more detail the motivation of soldiers to choose the army as a profession, to find out what motivate them in their daily service and to evaluate their motivation to participate in international operations.

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Keywords: *Lithuanian army; military identity dimensions; idealism; professionalism; warriorism; individualism.*

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Military Human Potential in the Context of Defence - Growth Relationship: Evidence from the Baltic States

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Introduction. Human capital is a major factor of economic development. Many recent investigations focus on human capital formation, development, and assessment [1-10]. The concept of human capital encompasses human health, knowledge, skills, motivations and abilities, which are formed as a result of investments and accumulate by person [8]. In their research, Šlaus & Jacobs (2011) [3] consider a broader view of human capital, which involves the knowledge, skills, attitudes and capacities of people as well as the social and cultural characteristics including the capacity for discovery, invention and innovation [3]. According to Eatough (2021) [11], human capital consists of several factors, such as hard and soft skills, education and training, intelligence and emotional intelligence, personality, work experience, employee well-being, and loyalty to the company. Zveglich et al. (2019) [7] also propose to include expected work experience when measuring human capital. Scientists use a variety of methods to measure human capital potential.

Human capital potential can be considered at three levels, such as individual, microeconomic, and macroeconomic. At the individual level, human capital evaluation includes quality of education, the improvement of the sphere of employment, and decent wages. At the micro level, the value of human capital is based on the cost of the company's expenses for training workers, labour protection costs, medical examination and insurance, the payment of sick leave and other social services [8]. At the macroeconomic level, the Human Development Index (HDI) is the most commonly used for the evaluation of human capital. The calculation of HDI is based on life expectancy at birth, the average number of years spent in education, expected duration of studies, and gross national income per capita [8]. Human capital as an economic category has qualitative and quantitative parameters [8]. In the articles prepared by the United Nations (UN, 2016) [4] and Chulanova et al. (2019) [8], retrospective (cost-based) and prospective (income-based) approaches are considered for the evaluation of human capital. The cost-based approach estimates the human capital stock as the depreciated value of the investment in human capital [4]. The income-based approach measures the value of the total stock of human capital as the sum of the discounted present value of all future income that individuals expect to earn throughout their lifetime [4]. The cost-based approach focuses on the input side, while the income-based approach evaluates human capital from the output side [4].

Contemporary studies show that military power depends not only on manpower, weapons, or resources, but in many cases, success on the battlefield is determined by the potential of human capital, including knowledge, skills, competences, and other capacities [1; 2]. Using a cost-based approach, the author focuses on the input side assessing military human capital potential in the context of defence expenditure – economic development nexus in the Baltic

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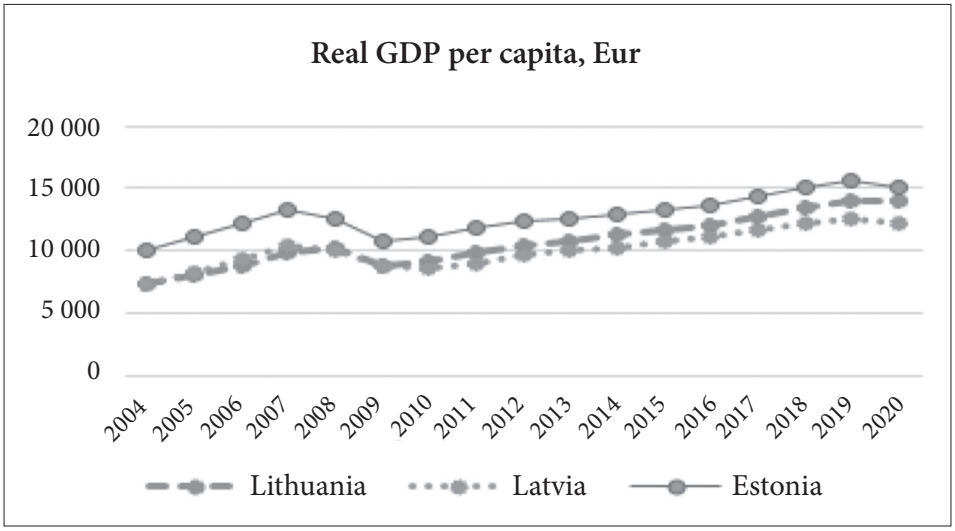
countries, such as Lithuania, Latvia, and Estonia. The investigation covers the period between 2004 and 2020.

Method of investigation. Research is carried out using econometric methods, including Spearman's correlation analysis and Automatic Linear Modelling (ALM). Defence expenditure on personnel has been used as a proxy for military human capital, and real gross domestic product (GDP) per capita as a proxy for economic development. The focus of this research was to answer the following questions:

- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Lithuania?
- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Latvia?
- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Estonia?
- What are the differences among the Baltic states in terms of the links between defence expenditure on personnel (investment in human capital) and economic development?

To answer these questions, a statistical analysis was performed using IBM SPSS 27v software.

Investigation Results. In the analysis, dependent variable Y is real GDP per capita, and independent variable, X is the defence expenditure on personnel. Figure 1 shows the tendencies of the dependent and independent variables. The dynamics of real gross domestic product per capita shows that the three Baltic countries follow similar trends, but Estonia has a higher level of economic development than Lithuania and Latvia. When analysing trends in defence personnel expenditure, it can be seen that during the period 2004-2020, expenditure increased in the three countries. However, Lithuania invests more in human capital than Latvia and Estonia, which have similar investments.



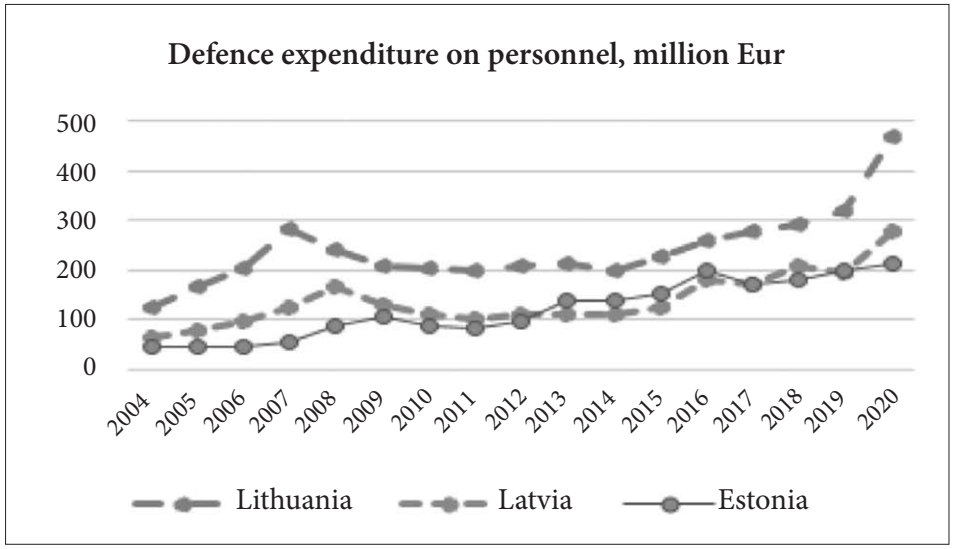


Fig. 1. The tendencies of dependent and independent variables

Source: Eurostat (2020) [12], NATO (2020) [13].

The correlation analysis reveals a very strong and significant relationship between real GDP per capita and defence expenditure on personnel in Lithuania, Latvia, and Estonia as well (Table 1). As personnel expenditure increases, so does the real GDP per capita.

Table 1. Spearman's correlation coefficient and its significance

Country	Correlation coefficient	Sig. (2-tailed)
Lithuania	0.792**	0.000
Latvia	0.870**	0.000
Estonia	0.804**	0.000

**Correlation is significant at the 0.01 level (2-tailed)

Source: author's calculations based on SPSS 27v.

The investigation of the relationship between defence expenditure on personnel (cost-based approach) and economic development reveals that investments in military personnel have significant and positive impact on economic development in the Baltic States. Defence expenditure on personnel explains 63.7 percent of variation in real GDP per capita in Lithuania, 71.3 percent in Latvia, and 63.4 percent in Estonia.

Conclusions. There is no consensus in the academic context on the factors on which the concept of human capital should focus. While some researchers identify skills, health, education, and training as the key factors of the concept, others take a broader view by including emotional intelligence, work experience, employee well-being, and loyalty to the institution, as well as the social and cultural characteristics. These characteristics are also important for military human capital, as they help to reveal its potential and fulfil an important national duty.

The relationship between human capital and economic development has been subject to extensive discussion as scientists seek to reveal how the value of investment in personnel (salaries, training, education, health) impact the economic development of the country. The defence sector is dependent on human resources and sensitive to their fluctuations. The investments in military human capital provide a positive impact on economic development, as the skills and experience acquired during military service produce a social benefit and the military outcome in the form of peace, stability and security.

The investigation of the relationship between defence expenditure on personnel (cost-based approach) and economic development reveals that investments in military personnel have significant and positive impact on economic development in the Baltic States. Defence expenditure on personnel explains 63.7 percent of variation in real GDP per capita in Lithuania, 71.3 percent in Latvia and 63.4 percent in Estonia.

Limitations. The study is limited to assessing the human potential of military from a cost-based perspective or from the input side. More detailed research is needed on the individual determinants of military personnel's potential, such as education, health, skills, emotional intelligence, experience, etc., and how they relate to the defence of the country in the face of contemporary threats.

Despite limitations, the author hopes that the results of the study will expand the scope of research across the Baltic states and will be useful for the achievement of the Sustainable Development Goals (SDG 8, economic growth).

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Keywords: *military, human capital, human potential, defence, economic growth, Baltic States.*

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A Devastating Tornado in Moravia 2021

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Introduction. A year ago, exactly on June 24, 2021, in the evening between 19:10 and 19:45, a devastating tornado hit South Moravia, which no one expected. The devastation it brought was extensive and overwhelming.

The expert article analyses, evaluates and discusses the whole unusual catastrophic disaster, although this range of expert activities is more for a National Professional Security Conference (seminar, workshop or other meeting) of top experts from erudite scientists and experienced academics, through top crisis managers and local authorities to individual intervening components of the national integrated rescue system. The main humanitarian organizations from the Czech Republic, which have played an important role in providing effective assistance to affected communities and citizens, must also be represented at the National Security Conference.

Research is currently underway at the Czech Hydrometeorological Institute to find out why only one of the many supercells in the area created a tornado and whether it is possible to obtain information from this experience that will help refine predictions of dangerous events. This is a relatively rare phenomenon that can occur more frequently due to sudden changes in the weather.

Hurricanes are the most destructive malignant storms on Earth. But tornadoes, although only a hundredth the size of a hurricane and last only a very short time, reach even more devastating stormy wind speeds.

Method of investigation. The article analyses the place and the role of tornado in Moravia 2021 (a part of the Czech Republic). In the evening shortly before half past seven on June 24, 2021, a devastating tornado hit the area between Břeclav and Hodonín in southern Moravia. Its rampage lasted only about 30 minutes, its destructive track is reported to be 27.1 km long and 250 meters to 2.1 kilometers wide. Several individual municipalities were affected in this area, but the most affected are the municipalities of Lužice and Mikulčice in the Hodonín region, and Moravská Nová Ves and Hrušky in the Břeclav region.

Investigation Results In the first days after the natural disaster, about 2,000 firefighters worked in the affected areas, and about 1,000 soldiers and over 500 policemen were deployed.

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Almost 600 pieces of special equipment were used. Hundreds of volunteers took part in the rescue and liquidation work, who also significantly helped not only the injured persons.

The worst tax was the loss of six lives. Several seriously injured people were transported to the nearest hospitals both in the Czech Republic and even in Austria.

In addition to the loss of lives, the tornado injured approximately 200 people. The damage consisted of heavily damaged buildings that were destined for demolition (200 out of 1200). Both family houses and farm buildings were damaged, as well as other local infrastructures, including a large part of the railway line in the Břeclav-Hodonín section, the high-voltage network and great damage was also caused to forest stands and agricultural areas.

Damage to the property of the South Moravian Region climbed to approximately 800 million Czech crowns, and 721 million damage was caused to municipal property. The total damage after the tornado is estimated at 15 billion Czech crowns.

Conclusions. The described tornado in the south of Moravia struck with the force F4, which is the second highest force of the six-point Fujit scale (F0 - F5). A tornado in this category can have a wind speed of 267 to 324 kilometers per hour. With its power, it compares houses with the ground, or takes away smaller buildings.

The authors of this academic article submit the following specific proposals for public discussion:
1. Raise awareness in the field of natural disasters, traffic and industrial accidents using mass media such as state television, state radio, press and the Internet.
2. Improve the speed, reliability and effectiveness of population warnings in the event of natural disasters, traffic and industrial accidents.
3. To convene in the autumn of 2022 or in the spring of 2023 a National Security Conference, workshop or symposium on the topic „Prevention and protection of tornadoes in the Czech Republic".
4. Prepare and verify the new type activity of the integrated rescue system called „Tornado prevention and protection".
5. To map the possibilities of international cooperation with neighboring countries in the field of prevention, preparedness, protection, rescue and liquidation of the consequences of a tornado.

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Keywords: *Moravia, emergency, tornado, integrated rescue system, rescue and liquidation work, humanitarian organizations, humanitarian aid.*

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Post-War Socialization of the Economy: Ukrainian and European Security

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Introduction. The full-scale war that began in Ukraine on February 24, 2022 was a challenge to the entire European security system and the world security system. It has affected all aspects of social and economic development of Ukraine. Its influence is felt not only in Ukraine, but also in European countries, which have received many refugees and also have now the war near their borders.

The war in Ukraine caused many problems related to security issues in Europe. These are the demographic crisis, the death and injury of people, leaving many Ukrainian citizens homeless, the migration crisis, the economic crisis, the environmental crisis [1-3]. All these consequences must be overcome by building a new model of post-war socialization of the economy, which is able to meet the above challenges.

The aim of this research is to investigate how the socialization of the economy changed during the war, to identify the main signs of postwar socialization and to suggest promising areas for economic reconstruction and rehabilitation of the security system for Ukraine and other European countries.

Method of investigation. Research methods are based on general scientific principles and fundamental theories of economic theory, the theory of globalization. The methodological basis of the study is static method of analysis.

The information base of the study will include statistics from the World Bank, the Organization for Economic Cooperation and Development, the State Statistics Service of Ukraine, UN publications, international indices and ratings, scientific publications of foreign and Ukrainian authors, Internet resources.

Investigation Results. The global environment influences the socialization of the economy through the interconnection and unification of cultures, international standards, norms, rules, as well as integration processes, strengthening the role of global actors in socialization processes, global trends, and challenges. On the contrary, socialization affects the global business environment through social responsibility, social standards, rules and regulations. A natural question arises: what will be the post-war socialization? It is obvious that public finances after the war will be directed to social benefits, education, retraining, and rehabilitation of the military and civilians after hostilities. It is important to resume state programs to support young people and young families in providing them with housing.

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This outlines not only Ukraine, but also European countries that have accepted Ukrainian refugees. The problem of socialization, employment, support at the household level and social housing are also relevant aspects of the post-war socialization of the economy and new security system of Europe.

Conclusions. The new model of post-war socialization will include raising the living standards of the population through attracting investment funds for social programs, rebuilding infrastructure and digital transformation of the economy [4-5]. The processes of digitalization and cyber security will play an important role in the post-war socialization of the security system of European countries.

Limitations. The limitations of this study are the lack of operational statistics on the assessment of losses from Russian aggression in all areas.

Keywords: *socialization; post-war; security; Ukraine; European countries; digitalization; challenges*.

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Sustainable Logistics Coordination by using the National Defence Resource Management Information System

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Introduction. Having an efficient and unified logistics system for the entire Lithuanian army (LA) is one of the most important priorities of the Lithuanian army. By introducing a modern logistics system, the capacities are increased, which will allow to ensure uninterrupted actions of the army in national and international operations. One of the main tasks of the National Defense System is to create an army logistics system in order to properly plan and ensure logistical support for units of the Lithuanian army and allied forces, to plan and carry out the redeployment of Lithuanian army units and logistical support in international operations. In order for the logistics system of LA to remain competent and adapt to new challenges, the Ministry of National Defense (MND) in 2016 took action and started implementing a 13-stage project, which developed and implemented the National Defense Resource Management Information System (NDRMIS). This project aimed to optimize the planning and management of the resources of the National Defense System, their accounting and control, and to ensure the transparency of processes. Although this system is new and brings many improvements to LA logistics, as with any innovation, employees have to adapt to it and learn how to use it, which can cause many unforeseen problems.

Notable, the logistics are the rationally interacting elements of a larger or smaller system, i.e. purchasing, warehousing, inventory, transportation, personnel, and sales as a whole. Logistics, compared to the traditional branches of finance, marketing, and production organization, is a branch of management science. The development of logistics science was determined by the desire to reduce monetary and time costs related to the movement of goods and the transition from the seller's market to the buyer's market, which influenced significant changes in the production and goods movement systems [1].

It is very difficult to provide an exact definition of logistics, as this term is defined very differently by both scientists and entrepreneurs, but after conducting an analysis of the literature related to logistics as a science and process, it can be stated that logistics includes all processes from the receipt of raw materials to the delivery of the final product to the consumer, and each process may have a different definition of logistics, but in each process the goal of logistics remains the same, which is to achieve the lowest possible costs.

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Before joining NATO, the Lithuanian army logistics system was formed on the basis of territorial defense and only limited supply operations and transportation functions. To ensure the full participation, maintenance, and rotation of the units of the Lithuanian army in NATO operations, mobile, fast-reacting, high technical-level support logistics capabilities were needed. Having an efficient and unified logistics system for the entire Lithuanian army is one of the most important priorities of the Lithuanian army. By introducing a modern logistics system, the capacities are increased, which will allow for uninterrupted actions of the army in national and international operations.

One of the main tasks of the National Defense System is to create an army logistics system in order to properly plan and ensure logistical support for units of the Lithuanian army and allied forces, to plan and carry out the redeployment of Lithuanian army units and logistical support in international operations. In addition, the Lithuanian army logistics system is being improved, aligned with the NATO logistics system, which ensures support for military forces in peace and war.

The purpose of this study is to find out the problems that have arisen after the emergence of the National Defense Resource Management Information System (NDRMIS). Therefore, the essential goal is to analyze the readiness and knowledge of the employees working with the NDRMIS system in the field of information technology.

Method of investigation. The research was carried out in several stages, which include: (1) preparation for the research, (2) organization of the research process, (3) collection and (4) processing of empirical data. Questionnaire survey is a widespread method of research in social sciences and this shows the reliability of the method [2], since the purpose of the questions in the questionnaire survey is to get to know and understand the researched phenomenon more thoroughly, to get more detailed information about the nature of the behavior that was tried to be clarified. So, to realize the first task, a questionnaire survey was chosen in order to identify problems and gaps arising when working with the National Defense Resource Management Information System (NDRMIS). Likert scale was used for all questions because it is widely used in surveys, especially when measuring attitudes, beliefs, and opinions. The Likert scale was proposed by Rensis Likert in 1932. He created a standard 5-point scale using adjectives with values ranging from "strongly agree" to "strongly disagree" with corresponding numerical values from 5 to 1. The "statements" of the Likert scale are presented in the form of statements with which the respondent can agree or disagree [3].

Investigation Results. One of the research tasks was to examine the most important problems faced by users of the NDRMIS system. The informants were asked eight questions about the NDRMIS system, which helped to identify existing deficiencies through descriptive statistical analysis. Based on the calculated averages and standard deviations of the scale statements for each of the questions presented, it was identified that informants have a negative opinion about the NDRMIS system, which was implemented to optimize the operational processes of the National Defense System resource management.

Summarizing the results of the descriptive statistical analysis, it can be said that when evaluating the NDRMIS system implemented by NDS according to each of the eight statements presented to the respondents in detail, the analysis revealed more and clearer information. It was found that the opinions of the respondents were the most unanimous when evaluating the fifth statement Q5" NDRMIS always saves my work", and the most difference was when

evaluating the first statement Q1" NDRMIS makes my work easier". It should also be noted that even 29% of the research participants did not want to express their specific opinion when evaluating "NDRMIS helps to manage the material assets assigned to me more efficiently", and the least weighted value of the evaluation scale was "neither agree nor disagree" when it was necessary to evaluate the installed system. malfunctions and express your opinion with the eighth statement "I often experience malfunctions of the NDRMIS system equipment". After additional comparative analysis, when the assessment of eight statements was compared by eliminating the middle point (3= neither agree nor disagree) from the Likert rating scale, it was possible to see the problems and reasons faced by users of the NDRMIS system: Q1 " NDRMIS makes my work easier"; Q2 " NDRMIS is always available"; Q7 " NDRMIS helps me manage the material values assigned to me more efficiently."

Conclusions. The study carried out showed that problems in working with the NDRMIS system occur for users for several reasons. Detailed descriptive and exploratory statistical analysis was applied to assess different aspects of emerging problems and problems solved due to work efficiency. The different applied research methods revealed important information and helped identify two main problems related to the effectiveness of the NDRMIS system: (1) Facilitating the work of users and (2) Effective management of material assets.

Limitations. We acknowledge that the study has some limitations that could be improved by repeated studies. First must be mention that this study only examines the logistical task problems faced working with NDRMIS by one of the LA units. Therefore, the results cannot be generalized to all LA departments where the NDRMIS system is used. However, to enhance generalizability, we recommend that future research expand the study to include the assessment of different logistics management systems that are using other NATO countries. Second, we acknowledge that this research has been done without the examination of the basic skills of users of the NDRMIS system. We believe that this study direction could help reveal the practical value of a more accurate logistics system in the implementation of strategic changes in the logistics task in LA.

Keywords: *sustainable logistics coordination; national defence resource management information system; Lithuanian army; national defence system.*

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Analysis of Manifestations of Aggression in the Intervention of the Emergency Medical Service

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Introduction. The central topic of this paper is the issue of manifestations of various forms of violence (aggression and verbal and physical aggression) during the provision of pre-hospital emergency care to members of the exit groups of the Emergency Medical Service in the Czech Republic and its secondary influence on the process of providing professional care. The practice of the profession within the Emergency Medical Service in the scope of paramedics is a highly exposed profession because these professionals are often confronted with negative emotions such as fear, anxiety, a sense of threat, sadness, anger, aggression and many others. They also provide pre-hospital emergency care in physically and emotionally draining moments of acute emergencies and crisis situations.

Based on the analysis of professional literature, as well as on the basis of experience from practice, it can be stated that members of Emergency Rescue Service exit groups often encounter manifestations of aggression and aggressiveness when providing pre-hospital emergency care. In the event of aggression and aggressiveness on the part of the aggressor (e.g. patient, patient's loved ones, bystanders, etc.), effective steps to calm the aggressor need to be initiated acutely at the scene of the emergency or crisis The process of gradual calming of the aggressor (de-escalation) consists of the following components: assessment of the situation (e.g. gathering of information and subsequent rapid analysis of all factors determining the current crisis situation), removal of height superiority, use of crisis communication and crisis negotiation tactics (e.g. calm and slower speech tone, maintaining eye contact, etc.). In the event of failure of the psychological factor, members of the Emergency Medical Services exit groups proceed to the pharmacological or technical factor. One of the other options is to use the synergy with members of the Police of the Czech Republic. In respect of the above facts, these professionals are prepared in their training to deal with aggressive acts, have the necessary protective equipment at their disposal and can use post-traumatic care after an aggressive attack. The paper deals with this issue comprehensively.

Method of investigation. The primary method of research included a literature search and document analysis. We focused on the issue of aggression and aggressive behavior towards the members of the Emergency Medical Services. The aim was to define the basic terminology and to map the current state of the issue. Another research method we used was a retrospective observational study, through which we analyzed data related to the incidence of aggression

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and aggressive behavior towards members of the Emergency Medical Services exit groups. Subsequently, the results of the findings of individual Emergency Medical Services in the Czech Republic are presented, which ways members of Emergency Medical Services on the scene can defend themselves against aggressive attacks. An integral part is the interpretation of the results, including their comparison with the results of other authors who have dealt with the issue at hand.

Investigation Results. The incidence of aggression and aggressive behavior towards members of the Emergency Medical Services exit groups has been demonstrated. The increasing incidence of this negative phenomenon has also been demonstrated.

Conclusions. The paper deals with the incidence of aggression and the related occurrence of psychological traumatization or physical injury in aggressive attacks. The concept of aggressiveness is not a foreign concept for the employees of the Emergency Medical Services, which is evident from the above-mentioned findings. Experience from practice, as well as the results of various studies reported in the literature related to this issue, also point to the fact that often the target of individual aggressive manifestations during the provision of pre-hospital emergency care are also members of ambulance groups of the Emergency Rescue Service or medical staff working in emergency rooms. In such cases, we encounter a contradiction where, on the one hand, professional assistance is provided and, on the other, these employees are the target of aggression, various forms of aggression and aggressive behavior. These incidents escalate into verbal or physical assault. This has a negative impact on the delivery of pre-hospital non-elective care for primary or secondary affected persons. In view of the increasing number of cases of verbal or physical assault, professional management of these negative expressions will become one of the essential skills of medical professionals.

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Keywords: *Emergency medical services, care, aggression, exit group, psychological trauma, Czech Republic*

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Aspects of Economic Warfare – Causes and Consequences

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Introduction. War is primarily an element of a certain policy. It represents one of the possible ways to achieve the stated goals of the policy. War is therefore a political phenomenon, but also an economic one. This means that the relationship between war and the economy involves many interdependent aspects. The relationship between the economy and war is dynamic and its character is constantly subject to the development of internal and external circumstances.

Favorable conditions have been created for the development of globalization processes. Globalization led to tensions in individual markets and state interventionism became increasingly evident. After the annexation of Crimea by Russia in 2014, the processes of economic war have been gaining a momentum. Another continuation of the economic war occurred after the Russian invasion of Ukraine in February 2022.

Method of investigation. The contribution is devoted to the definition of economic warfare and its position in the system of international relations. Using selected examples, the role of economic war in shaping the state´s internal and external policy is described using the historical-logical method. With the help of a descriptive comparative method, it presents a typology of the elements of a trade war.

Investigation Results. Economic factors influence a country´s decision to go to war or use economic warfare. Military conflict is only a last resort. The authors conclude that the leaders of the given countries should always weigh all the pros and cons and not get carried away by the vision of economic gains that military conflict can bring. A military conflict will always have a significant impact on the economy of the country involved, but it depends on other circumstances whether this intervention in the economy will be beneficial or harmful for the state.

The model of preferences for entry into a war described in this contribution depends on the economic situation. This model represents a state´s willingness to enter a war conflict and outlines the likely response in the form of an effort to change the state's economic situation.

W Economic situation of the country

f(ua) the benefits that a war conflict can bring to state A

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f(ub) the benefits that a war conflict can bring to State B

a the military strength of the rival state

C the financial capabilities of the adversary

$$W_a = f(u_a) - a*f(u_b) - C$$

Tab. 1 The willingness of a state to enter a war conflict

Basic condition	Probable reaction
Good economic situation of State A (Wa high) Competing state B is economically insignificant a = 0 Cost of possible war due to low financial capabilities of adversary C = small	Preference rate, no need to increase W
Good economic situation of State A (Wa high) Competing state B is economically strong a = -1 C grows with the GDP of country B	Preference rate, no need to increase W
Poor economic situation of country A (Wa low) Competitive state B economically strong a = -1 C grows with GDP of country B	Preference for conflict, growing need to increase W, but with uncertain outcome
Poor economic situation of country A (Wa low) Competing state B is economically weak a = 0 financial capabilities of rival state C = low	Preference for conflict, growing need to raise W

Conclusions. Nowadays the economic warfare is much more sophisticated and is part of a political-military strategy aimed at defeating the adversary, using various tools, the use of which must be adapted to the specific situation, considering all its specificities, because the use of the right tool or combination of tools in the right time will significantly affect its effect and thus the success of the procedure used. In an increasingly global economy, economic progress has become a popular policy advocacy tool. The need to protect national business interests from competition therefore often leads to war.

Restrictive measures vary by area of use. Those with economic aspects are part of the political approach in foreign relations, which is applied for the purpose of protecting recognized values, interests, and security, strengthening, and supporting democracy, the rule of law, human rights, and principles of international law, strengthening international security and preserving peace.

Limitations. Due to the extensiveness of the investigated issue, the multifunctional consequences of the economic war and the sanctions used have not been investigated on a large scale. Data from a macroeconomic perspective in relation to Russia´s aggression against Ukraine was only marginally used.

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Keywords: *warfare, globalization, economic warfare, economic sanctions, trade war*

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The Motivation to Increasing National Security by Strengthening Energy Independence from Unfriendly Countries

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Introduction. Defense analysts note that the military forces of countries are reforming into a perception of warfare based on new technologies and the management of human resources, so changes and the introduction of innovations in defense are one of the main effects of using the defense capacity to adapt prevention against asymmetric threats. In times of peace, strategic defense of the country is created and improved, applying innovations in warfare, in order to respond to threats proportionately if necessary. Modern advanced strategic decisions are made preventively to allow unfriendly countries to assess the capacity for defensive preparation and preparation to counter a possible threat.

The practice of the United States of America shows that artificial intelligence, robotics, and nanotechnologies create high added value with high returns in the defense of the country, so the payback of investments in high technologies is visible through strategic changes in advanced technologies. It has also been observed that innovation alone is not enough to modernize the defense capacity, changes are needed through culture, organization, and doctrine, and this may cost much greater efforts than new armaments.

As energy resources decrease, there is a struggle for resources to dominate strategic areas of defense and to occupy important negotiating positions in the political arena, as well as to ensure security in the development of the state. So, the increasing consumption and dependence of energy resources encourage states to create new strategies. Therefore, it can be said that the security of the state depends on energy resources in case of political instability in the geopolitical region.

The National Security Strategy provides for the development of infrastructure projects of the Republic of Lithuania that increase the economic and energy security of the Baltic States. The Lithuanian military doctrine indicates the principles and tasks of warfare, because the National Defense System (NDS) must operate innovatively, effectively and independently. Also, the development of defense, experimental programs of innovative activities, the emergence of technologies and politics in the Republic of Lithuania are implemented by scientific and business institutions. Moreover, the European Defense Strategy and Policy Guidelines envisage strengthening defense capabilities through investment in research and technology. Lastly, it is intended that the developed capacity should be adequate for modern defense threats when forming the defense innovation development strategy of the Ministry

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of Defense. Hence, this study is fully focused on the issue of energy security, which is known to be one of the key components of national security. Furthermore, these research focuses on how the NDS develops an energy security strategy in the field of national defense through innovation.

Method of investigation. Statistical data was collected for this investigation and an additional qualitative study was conducted. Information for qualitative analysis was collected using a semi-structured and in-depth interview method. The text of the responses of the respondents was analyzed using a qualitative research methodology. An analysis of the content of the statements presented to the respondents was carried out and additionally a ranking of the criteria chosen by the author was carried out. The interview text was used as the main material for the research analysis and analyzed only in the context of the specific text. The results of the analysis conducted were obtained by applying the comparative analysis method of the content of the text under consideration. The strength of each expert's opinion was determined by ranking the statements in the questionnaire. It also helped clarify the importance of the criteria assessed in the study.

Investigation Results. The development of innovations in energy of the national defense system (NDS) is the next strategic step of the state towards the modern development of national defense, energy independence and economic well-being. In developing the innovative energy infrastructure of the country's defense with the aim of countering threats to critical technologies of the energy sector, networks, companies producing or processing electricity, gas, which directly or indirectly cooperate with the public defense sector. In the dynamic world energy policy, the resource resources, which are decreasing, have a great influence, so alternative energy sources are being sought.

Reviewing the distribution principal of energy resources in Lithuania, based on the official statistics, the final consumption of fuel and energy in 2015-2019, it can be said that in 2019 crude oil and oil products (39%) and natural gas (23.9%) accounted for the largest share of fuel and energy costs. In 2019 70% was imported to meet Lithuania's needs of electricity, as well as its production in the country, increased by 13.1 percent. From renewable energy resources in 2019 was produced 62.2 percent of all electricity. According to the consumption of electricity in the country in 2019 (52.7%) went to households and (26%) for industry.

According to the country's energy demand, we see that households and industry consume more and more energy, which needs to be imported from other countries. The study shows that the energy demand in Lithuania is increasing, especially in terms of car fuel consumption and the amount of electricity consumed.

Conclusions. The research results showed that maintaining the defense capacity by reducing energy costs and using alternative energy the national defense system is one of the biggest challenges, as the absorption of innovations is too slow, cooperation with the private sector does not produce clear innovative results. To maintain combat readiness, NDS cannot reduce costs at the expense of security for today.

The ongoing projects are aimed at strengthening energy independence from unfriendly countries. However, the innovative direction of renewable sources is one of the perspectives of NDS to enable energy autonomy, which would be achieved through hybrid innovations, that is the complex use of renewable and fossil energy sources such as diesel, gasoline and gas. Adaptation of old technologies to new ones during the transition period is also important.

NDS cooperation with the private sector should be encouraged in the direction of private farm renewable energy policy. The study showed that planning energy resources is one of the essential criteria of energy security, helping to assess the distribution of funds and opportunities for innovation planning.

Keywords: *energy independence; national security*; *hybrid innovations; semi-structured expert interview.*

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Risks of the Effects of Restrictive Measures on the Democratic Foundations of the State

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Introduction. The implementation of any measure by the state must be in accordance with the principles of the rule of law, which must also be observed during crisis situations. Criteria are established to assess compliance with these principles. These criteria include legality, legal certainty, the prohibition of arbitrary use of executive powers, and the accountability of governments to legislation, which is guaranteed by judicial and parliamentary control. If extraordinary powers are used, they must fulfill the factor of necessity, adequacy and temporality. They must always be implemented not only within the limits of the constitutional law of the given country, but also in accordance with the standards established by European and international law [1].

Fundamental rights, the principles of the rule of law, and the duty to abide by democratic principles are laid down in the Treaty on the European Union (EU), the Charter of Fundamental Rights of the European Union and within the framework of obligations in the field of international law, which have been accepted, on the basis of their sovereignty, by all EU member states [1]. According to international law, every state has the duty to observe, protect, and promote human rights. These are international obligations; the principle of their compliance should not be the subject of political discussion. Authorities must ensure that their responses to threats are democratically debated, publicly consulted, and subject to parliamentary control. The aforementioned principles also include the necessity to deal with fake news, including in situations where such news is based on the intention to weaken a political opponent. Fake news can reduce the effectiveness of restrictive measures (emergency) applied in response to a crisis situation [1].

The regional and local impact of the covid-19 crisis is highly heterogeneous and has significant implications for crisis management and policy responses [2]. The article deals with the risks of territorial impacts resulting from the restrictive measures of the government as part of the solution to the pandemic crisis situation in the Czech Republic (CR). The risks of impacts of the adopted antipandemic measures manifested themselves in all areas of society's life, both in the field of healthcare, economy, education, and also in the fields of social, political, and security [2].

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Method of investigation. A risk matrix is applied to assess the defined risks. To evaluate the risks associated with the identified *j-th* hazard and the impacts caused by it, a semiquantitative point method is used, working with values for probability, impacts, and the opinion of the evaluators, called the PCE method (Probability, Consequences, Evaluator) [3], where:

a) item P assesses the probability with which the considered *j-th* hazard can occur, on a scale ranging from 1 to 5, where 1 corresponds to the lowest probability, 2 to small, 3 to medium, 4 to large, and 5 to the highest probability;

b) item C evaluates the amount and severity of the consequences (impact) caused by the activation of the *j-th* hazard, on a scale ranging from 1 to 5, where 1 corresponds to the lowest, 2 minor, 3 moderate, 4 major, and 5 the highest severity of the consequences;

c) Items E and E take into account the opinions of a group of evaluators who take into account the level of severity of the threat, the accumulation of risks, the factor of time and other factors that affect the risk. The evaluation was again carried out on a scale from 1 to 5, where 1 corresponds to the lowest level, 2 small, 3 medium, 4 large, and 5 the highest.

Probability $P(t)$, Consequences $C(t)$ as well as Evaluator opinion $E(t)$ are functions of time *t*. The risk severity value *R* was calculated according to the formula: $R(t) = P(t).C(t).E(t)$.

The group of evaluators assessed 20 threats and risks arising from them using the method above. Threats were identified based on anti-epidemic measures taken and their potential impact on society, democratic foundations, and the internal security of the state [4-7]. The group of evaluators was made up of 48 members who represent expertise, disciplines, and organizations in the fields of economy, tourism, security services, psychology, political science, the Army of the Czech Republic (ACR), customs administration, State Material Reserves Administration, law, education, healthcare (virology, psychology, oncology), culture, journalism, and the general public. The evaluators were selected based on the criteria of erudition, reputation, and willingness to participate in the survey.

A group of evaluators identified eight of the most serious threats out of the 20 threats assessed using the PCE method.

Investigation Results. The eight most serious threats from the implemented pandemic measures threatening the internal security of the state and its democratic foundations are shown in Table 1.

Table 1. The risks that most threaten the security and democracy of the Czech Republic

ID	Threat	Risk of a threat	P	C	E	R
1.	Threat to public health	Loss of life caused directly by the pandemic as well as insufficient care in other medical fields	5	5	5	125
2.	School closures	A reduction in the level of education and the related reduction in human capital	4	5	5	100
3.	Abuse of power, corruption	Corruption in public contracts	4	5	4	80
4.	Destabilization of the political situation	The fall of the government, the chaos in dealing with the pandemic	4	4	4	64
5.	Restrictions on services, trade and industry	Reduced incomes of legal entities and natural persons doing business; economic losses of the state, regions, municipalities	5	4	3	60

6.	Manipulation of public opinion	Strengthening/weakening the political power of the government or the opposition; causing distrust in the government	5	4	3	60
7.	Increase in extremism, sects, anti-social phenomena	Increase in crime; deterioration of the internal security of the Czech Republic	4	5	3	60
8.	Takeover of bankrupt businesses by foreign capital	Loss of control of the Czech Republic over its own economy	4	5	3	60

Conclusions. From the results of the survey, it can be concluded that three risks with the most serious impact, which can affect the internal security of the state (CR) and its democratic foundations, have been identified. The risks resulted from the ongoing pandemic and the restrictive measures adopted by the government. The risks are:

1. the risk of loss of life directly caused by the pandemic as well as insufficient care in other medical fields resulting from the threat to public health;
2. the risk of a reduction in the level of education resulting from the threat of school closures;
3. the risk of corruption in public contracts and subsidies resulting from the threat of abuse of power [8].

Based on the identified risks with a territorial impact, it can be stated that the Czech Republic may still be affected by the pandemic both in the area of healthcare and in the areas of economics and security. The closure of schools has long-term serious social and financial consequences for society [6,9]. For the functioning of the state, the loss of trust in the authorities, the danger of dividing society, and the paralysis of state power at the moment when the government's measures are not respected [2,5,7] appear to be very significant threats. The loss of trust was caused both by mistakes on the part of the authorities and by a disinformation campaign [10], which the government of the Czech Republic was unable to fight successfully.

Limitations. The evaluation group consisted of 48 members. Their qualified estimate in assessing the risks arising from restrictive pandemic measures was dependent on their subjective opinion, which was influenced by their political mindset.

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Keywords: *democracy; current threats; emergency management; internal state security; pandemic; restrictive measures; risk assessment; risk matrix*

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Analysis of the use of Post-Trauma Care and Crisis Intervention Among the Emergency Services with Regard to Job-Related Psychological Strain

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Introduction. The central topic of the presented paper is the issue of providing crisis intervention, post-traumatic care and psychosocial intervention services in the basic components of the integrated rescue system (hereinafter referred to as the IRS), in view of the fact that members and officers of the IRS in the performance of their profession get into a number of traumatic situations in which the effects of dealing with emergencies and crisis situations, such as problematic behaviour on the part of victims, affected persons, their family members or bystanders, affect their psyche. Almost every day they encounter emotionally stressful situations such as traffic accidents with serious injuries or deaths, mass disabilities of persons, notification of deaths to survivors, dealing with emotionally and physically demanding conflicts with aggressive persons, interventions against aggressive or armed perpetrators, crisis negotiations with persons demonstrating an intention to commit suicide, etc.

All of the above-mentioned crisis situations and emergencies have a negative impact on the psychological state of members of the IRS. Although they undergo a demanding psychological examination upon entering the service (they must therefore meet the condition of mental health and stress resistance), long-term exposure to factors that provoke an acute or chronic stress reaction can cause psychological trauma and gradually contribute to the eventual disruption of the individual's psychological balance. Taking into account the above mentioned facts, a system of providing post-traumatic care has been created in the individual units of the IRS and the issue of providing this care is the subject of the present paper.

Method of investigation. The primary method of research included a literature search and document analysis. We focused on the possibilities of providing crisis intervention and post-traumatic care in the basic components of the IRS. The aim was to map the current state and legislative framework of the issue. Another research method we used was a retrospective observational study, through which we analyzed data related to the frequency of use of individual methods of professional help (e.g., consultation with a psychologist, crisis intervention, peer support, Anonymous Crisis Line, etc.), including the possibility of using follow-up professional

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care. An integral part of the research was the implementation of an anonymous non-standardized questionnaire survey, where the criterion for selecting respondents was employment in the basic components of the IRS. The attention was focused on determining the utility of post-traumatic care by respondents, including their views on the trust and effectiveness of this professional help. Subsequently, the results of the statistical analysis of the data obtained and the interpretation of the results are presented, including their comparison with the results of other authors who have conducted research on posttraumatic care.

Investigation Results. A correlation between occupational performance in the basic components of the IRS and traumatization has been demonstrated. In particular, a negative effect of the COVID 19 pandemic on psychological state was detected. An increasing incidence of contacts to the Anonymous Crisis Line and the provision of crisis intervention was also demonstrated. A negative finding was that despite the increasing need for post-trauma care, respondents' distrust of the anonymity of the care provided was prevalent.

Conclusions. The main objective of this paper was a comprehensive analysis of the post-traumatic care system in the basic components of the IRS. It is a relatively new system abroad and in the Czech Republic, which is constantly evolving in response to the variability of changing traumatic events in relation to the performance of the profession (e.g. the COVID 19 pandemic, the military conflict in Ukraine, etc.). The theoretical part focused on defining key concepts related to the issues of traumatization, response to severe stress, post-traumatic stress disorder, adjustment disorders, etc. The research part presents the results of the analysis of the current situation, the results of the questionnaire survey and the comparison of the results.

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Keywords: *trauma, posttraumatic interventional, crisis, crisis intervention, Integrated Rescue System*

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The Impact of Disciplinary Action for Crime Prevention

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Introduction. The Swedish Armed Forces has changed its stance on punishment through disciplinary action in disciplinary cases. In the beginning, punishments in the form of physical beatings, hanging, or other retribution were carried out to keep the soldiers in order. During the 18th century, a reform was taking place in Europe that changed the philosophical point of view. The cruelest philosophical point of view is that physical punishments were replaced with time in jail. Furthermore, the 1970s saw further disciplinary reformation through deductions in salary. This form of punishment is the most common in the Swedish Armed Forces of today.

Since peacekeeping operations aim to create and preserve peace and stabilize the area from a conflict, it becomes problematic if the peacekeeping force itself commits a crime. In Sweden, the legislation was changed during the latter part of the 20th century to remove the possibility of containing military personnel who commit punishable acts in custody or extra duty and was replaced with mainly salary deductions. This study investigates whether there is any connection between the choice of discipline punishment and the number of discipline cases during Swedish peacekeeping operations. Peacekeeping operations compared in the study are parts of Swedish efforts in the Congo (1960–1964) and Bosnia (1993–2000).

Method of Investigation. At first, a data set was created based on primary sources from the National War Archives. Each case was established by the Military Police in their respective areas of operation. In total, 724 cases were established in the first year of both operations. The cases are divided into operations as follows: Congo – 252, Bosnia – 472. The cases were processed by the organization and resulted in a total of 529 disciplinary cases, while no further action was taken in the other 195 cases. The disciplinary cases are divided in this study into four major categories: *misconduct penalty*, *alcohol-related*, t*raffic violations,* and *other.* Misconduct penalty cases include a wide variety of errors, for example, late arrival, bad behavior, AWOL, contraband. Alcohol-related cases include instances of suspects being intoxicated. Traffic violation includes cases in which vehicles were involved, including acts of driving under the influence of alcohol and/or other drugs. The data set also includes Other, which includes cases that do not fit the other categories, for example, cases of sexual harassment and gross negligence. The disciplinary action is divided into six categories: *imprisonment*, *extra duty*, *salary deduction*, *warning*, *dismissal,* and *other*. The category *second* includes cases that led to civil prosecution or an unknown action was taken. The analysis was performed with IBM SPSS Statistics 27v software.

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Investigation results. The results show that with the possibility of disciplinary measures such as arrest or extra duties, the number of disciplinary cases between the first and second missions in the Congo decreased. Disciplinary actions taken per person decreased from 0,300 to 0,163 in the first year. Meanwhile, in Bosnia, when salary deductions were the main disciplinary action, an increase in the number of disciplinary cases was observed between the first and second missions. Disciplinary actions taken per person increased from 0,150 to 0,163 in the first year. However, the study found that the number of disciplinary cases decreased drastically during the operation in Congo and the increase in disciplinary cases in Bosnia, but it cannot prove that the choice of disciplinary action was the reason for the result. The number of disciplinary cases is presented in Fig. 1.

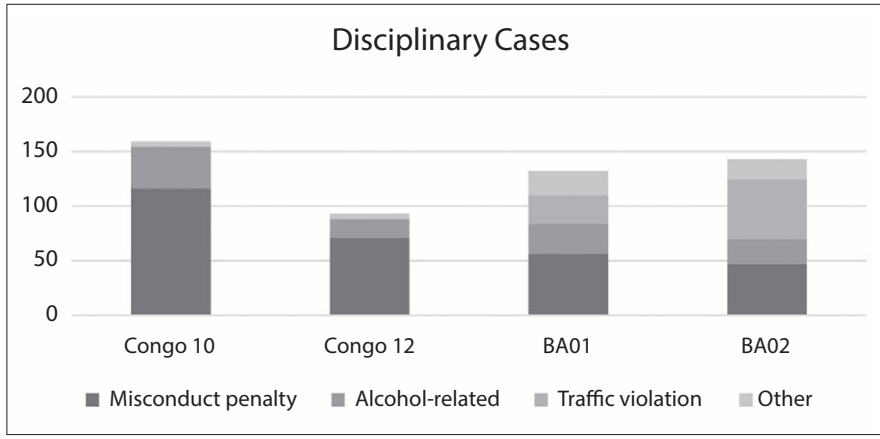

Fig. 1 The first two stacks show the number of disciplinary cases in the first and second mission in Congo, and the last two stacks show the number of disciplinary cases in the first and second mission in Bosnia.

Conclusions. By comparing two peacekeeping operations that had different ways of punishing disciplinary offenders, the aim of the study was to investigate whether the choice of disciplinary action had an impact on the number of disciplinary cases. The results show that the number of cases decreased in Congo but increased in Bosnia.

In conclusion, on the one hand, the change of disciplinary action does not contribute to a crime prevention effect. On the other hand, having soldiers detained disturbs the harmony within the unit due to the burden of unequal working hours.

Limitations. More research is needed to gain a more nuanced understanding of the phenomena. The study proposes the following avenues of research:

- Extended surveys to ensure the outcome of each operation.
- Deeper research of personnel on cohesion and social constructs.
- More thorough research into differences in legislative changes.
- Further research into empirical data to enable statistical tests.
- Deeper research on possible directives and working methods.
- Comparisons to other peacekeeping operations.

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Keywords: *Swedish international operations, peacekeeping operations, Military Police, disciplinary action, crime prevention, Congo, Bosnia.*

The Motivation of Generation Z to Serve in the Lithuanian Army

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Introduction. Since 2008 after postponing the mandatory initial military service, the transition was made only to the army formed on a professional basis, professional military service. Not long after, a significant decrease in the number of soldiers was observed. The filling of the vast majority of army battalions was only 35%. So in 2015 March 19 in connection with the changed geopolitical situation in the world, mandatory initial military service was returned in Lithuania by the Seimas resolution (Assessment of Threats to National Security, 2018). It was expected that this would increase the number of soldiers in the Lithuanian army. However, according to statistical data, the number of people willing to serve in the Lithuanian army continues to decrease, albeit slightly.

According to researchers [1], a soldier is a flexible resource of the army, which, depending on the environment created, can perform worse or better. In fact, motivation phenomenon is highly important in all organizations' processes for humans and can cardinally change the behavior of the entire organizational system. Therefore, to improve the Lithuanian national defense system, for the same reason, it is very important to create the most favorable conditions for serving soldiers and, for this reason, the selection of the most attractive ways to improve the existing motivating process of the soldiers must continue.

Notable, the war is rightfully classified as one of the most difficult types of activity, as soldiers often have to work in very difficult, life- and health-threatening conditions, experience great physical strain, various psychological and spiritual shocks and trials. They must be ready to calmly accept and endure the horrors of combat, not be disturbed by difficult and dangerous circumstances, and have knowledge of psychological phenomena occurring during combat and other extreme situations.

The motivation of generation Z to serve in the Lithuanian army is not widely studied in the works of researchers. This topic is discussed only episodically. Although the researchers emphasize the importance of motivation in encouraging young people to serve in the Lithuanian army and present the specifics of soldiers' motivation: moral, historical (including military) traditions and values are fostered in the army, motivational measures are applied that are relevant for modern youth, the possibilities of attracting them to compulsory military service, but the impact of the Covid -19 pandemic was not addressed in these studies.

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The main purpose of this study was to find out what traits of generation Z can influence their motivation to serve in the Lithuanian army in the face of the COVID-19 pandemic.

Method of investigation. To achieve this study, qualitative research and the semi-structured interview method were chosen. Open questions were prepared in advance and presented to participants in free form. This study method was chosen because during the research it is possible to work flexibly, depending on the changing situation, and when receiving all relevant information verbally during direct contact, it is possible to raise additional questions to get the most detailed and clear answers. The aim of the interview was to understand the informants' experience, to find out their opinions on the research questions, which they expressed in their own words.

Investigation Results. Analyzing the reasons and motivations given by the informants who represented generation Z, the motives that prompted them to choose/perform permanent mandatory initial military service were pointed out. The main categories emerge as external factors: military, the profession is prestigious; family, friends; stereotypes in society. The COVID-19 pandemic is unfortunate, and the event and internal factors papier: the opportunity to improve, to realize oneself; career opportunity; a desire to serve his own for the country; the desire to comfortably "arrange" life goals precise. Where the main were two: (i) the desire to be comfortable "compose" of life; (ii) Opportunity improve, realize yourself. In view of this, during the investigation the aim was to clarify the opinion of the informants, what motivational measures are applied by them during initial military service, and the main were two: (i) free time from service; (ii) cash payments upon completion of the service.

Conclusions. The results of the study showed that the Lithuanian army is, in fact, focused on the motivation of its soldiers. Given that these are in times where financial resources are highly valued, the aim is primarily to motivate soldiers and guarantee competitive wages. Attention is also focused on travel expenses compensation, social guarantees ensuring the soldier's quality of life; career, learning, and participation in international missions and leisure opportunities. All of this is financed by the state budget. Considering the fact that the profession of a soldier in society is considered prestigious, prestige is increasingly emphasized when recruiting potential soldiers to serve in a military organization.

After conducting a qualitative study, it was found that in the face of the COVID-19 pandemic, Generation Z soldiers of mandatory initial military service believe that their decision and motivations to remain in professional military service are determined by the following factors: (i) monetary motivation (meaning salary and supplements to it); (ii) nonmonetary motives: desire to serve one's country, prestige, career, social guarantees, sciences, positive microclimate, working character, physical activity, stability. Other values that may influence the decision to serve in the Lithuanian army are also listed: patriotism, family, unity, freedom, curiosity, security, honour. The outbreak of the COVID-19 pandemic affected the normal order of the Lithuanian army and caused negative emotions among the serving soldiers. The fundamental change mentioned by generation Z was that during the pandemic it was not possible to leave the place of duty, visit family members, friends.

Keywords: *Lithuanian army; traits of generation Z; motivation; semi-structured expert interview.*

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Energy Efficiency in Military Camps

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Introduction. Frequently in the past, the heavy consumption of all types of resources and energies has attracted almost everybody's attention for various reasons. But under the current combination of dire circumstances in the world affairs, the issue of energy use has become even more burning and urgent. Moreover, this problem is not solely limited only to energy usage but covers the whole life cycle from large-scale production up to energy recovery or reuse of resources.

The energy efficiency of devices and appliances that consume energy of any kind is becoming the significant feature when acquiring such new items. Even the International Energy Agency (IEA) aptly calls the energy efficiency the first fuel of a sustainable global energy system [1]. According to some scenarios mentioned in the IEA report on energy efficiency, the more efficient appliances can contribute to energy savings of 20% to 30% when being a part of energy management systems in the buildings [2].

Method of investigation. The energy efficiency is not only essential for households and private companies, but it is also strategically vital for the military. During the 2022 NATO summit in Madrid member states declared that they would contribute to combatting climate change by reducing greenhouse gas emissions, improving energy efficiency, investing in the transition to clean energy sources and leveraging green technologies, while ensuring military effectiveness and a credible deterrence and defence posture [3].

The energy efficiency, together with energy use and energy consumption, is also one of three pillars of the energy performance concept as stated in the Czech technical standard ČSN EN ISO 50001 about energy management [4]. Also, in the same document, the energy efficiency is, in a very generic way, defined as a ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy [4].

Investigation Results. There are many references focusing on the energy efficiency of temporary shelters and provisional buildings, that can be used as an integral part of humanitarian relief effort but also in military bases and camps for accommodation of the deployed forces. In [5], parametric studies are conducted using advanced materials to seek energy efficiency improvements in tents, and it provides a method of energy modelling for soft-wall shelters. In [6], two prototype emergency shelters were tested in controlled, low temperature conditions, with aim to improve conditions inside temporary shelters and to develop tools to assess shelter quality and comfort. In [7], a cost reduction in climatization for

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low-cost buildings using passive cooling and heating technologies are studied, and it shows they provide better thermal comfort, reduce initial investment and energy consumption.

Conclusions. The energy efficiency is an important part of energy management system, as it is stated in Energy Management Handbook for NATO deployed force [8], where two areas of intervention are mentioned to achieve energy efficiency: technical and non-technical solutions.

In broader terms, the energy efficiency plays an essential role in the environmental protection in the military, during exercises and operations, especially when host nation is involved in this sort of activities. Within NATO, the requirements are arranged in a group of several standards called Allied Joint Environmental Protection Publications (AJEPP) [9–13], with primary aim to provide commanders and officers with best practices and standards in environmental protection.

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Keywords: *energy efficiency; military camp; sustainable defence solution.*

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Role of the Lithuanian Army in Controlling the Illegal Migration Crisis

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Introduction. The phenomenon of the refugee crisis, which has existed since ancient times, is extremely relevant for Lithuania these days. Since migration is a dynamic process, the definitions of migration found in the literature vary greatly and the content depends on the context of the national level in which it is used, political, economic, or social. Analyzing the scientific literature reveals various and different concepts of the concept of migration.

Examining the concept of migration can lead to the concept of forced migration. Migration is classified into voluntary and forced. Voluntary migration is the migration of persons to another country for economic reasons, while forced migration is associated with political and social unrest and being forced to leave one's home country and seek refuge abroad. The concept of a forced migrant includes a person with refugee status who has received asylum in a host country. An asylum seeker is a migrant who has been granted temporary protection and issued a residence permit. A forced migrant goes through several stages: he becomes an emigrant in relation to his country of birth, he becomes a migrant when crossing the borders of other countries, and he becomes an immigrant in relation to the host country. There are often cases where migrants trying to escape hostilities do not have permission to cross the border but may have asylum in the host country [1].

In general, migration is a very broad concept and has more than one definition. In order to systematize this concept, it needs to be classified from different points of view: form, motive, time, scale, direction, and legal status. This classification system makes it easier to examine the definition of migration.

The recent events due to the influx of illegal migrants from Belarus to Lithuania received a great response, and to control this crisis, the Lithuanian army was also used. Additionally, the activities of the Lithuanian army during crises are mostly examined in the laws and resolutions of the Republic of Lithuania. Among the foreign authors, Matthew N., Metzel and John M. Lorenzen [2] have published a number of scientific works, they analyzed and described the interaction between the military and various civil organizations in order to control mass migration. The impact of illegal immigration on national security is analyzed by Estevens, J.[3].

So, this study topic is focused on illegal migration and has not been sufficiently explored before. There are only a few scientific works; therefore, the greatest attention in these research

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works was paid to the legal documents of the Republic of Lithuania, based on the laws of the Lithuanian military service and other sources of information.

Method of investigation. To examine how and in what ways the Lithuanian army contributes to civil protection support in the field of illegal immigration, an analysis of documents was carried out: cooperation plans, meetings, reports and structured expert interviews. In particular, the research question is exploratory in nature and participant responses can guide future research questions and help develop a more robust knowledge base for future research. Therefore, taking this into account, a semi-structured expert interview was chosen to implement the purpose and objectives of the research. According to Rowlands et al.[4], this survey method is suitable in cases where the topic is not sufficiently explored and allows one to understand the essence of the topic, nuances, and identify problems and unknown aspects. Also, a semi-structured expert interview was chosen for other reasons:

- There is a rather limited number of specialists who can provide the information necessary for the investigation. Therefore, it was chosen as an independent method of information collection, with a limited and small sample.

- In this way, detailed information about the current situation and emerging problems can be obtained.

- Questions raised during the interview can be clarified.

Investigation Results. Study results proved that Lithuania is usually chosen as a transit country. The trend of illegal migration in Lithuania has increased. in 2021 the number of illegal arrivals increased 55 times compared to 2020. and 110 times compared to 2019.

All who participated in this study unequivocally confirmed that the support of the Lithuanian army is necessary in the control of illegal immigration, because it is a hybrid threat against the state of Lithuania. According to the majority experts, the army can be involved when responsible institutions cannot control this crisis by themselves.

The implementation of border protection is a direct task of the State Border Guard Service (SBGS) under the Ministry of Internal Affairs. Therefore, the Lithuanian army should be called upon when the SBGS cannot cope with this task. Also, experts emphasized that with the help of the army, consistent planning is required based on the decision-making process, indicators, and threat analysis.

Conclusions. To summarize all study results, it can be concluded that in addition to the main mission of defending the state, the Lithuanian military forces devote their efforts to secondary tasks in emergency situations: providing support to civil institutions. In controlling illegal migrants within the state, the Lithuanian army supports the State Border Guard Service and other institutions by allocating its human resources and material resources. Performs the following functions: carries out patrols at checkpoints, helps to set up camps for migrants, monitoring the place of detention of refugees, and erects a wire fence. Soldiers of the Air Force's unmanned aerial vehicle units are also helping to protect the state's border by launching a reconnaissance aircraft. Lithuanian soldiers also participate in naval operations and contribute to the control of illegal migration in the Mediterranean Sea and participate in various international missions.

Keywords: *illegal migration; Lithuanian military forces; civil protection support; State Border Guard Service; semi-structured expert interview.*

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Employment of Lithuanian Military Resources to Manage Emergency Situations

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Introduction. We live in a relatively peaceful country, but this does not mean that we cannot be affected by threats from neighboring countries. If a technological disaster occurs in neighboring countries (danger of radiation, polluted air), most likely an emergency situation will be declared in our country. Furthermore, we live near large countries that have recently promoted new social unrest and military conflicts, so we cannot help but think that a new threat may appear at any time, which will also require the help of the military. You don't have to think about emergencies or catastrophes every day, but it is very important to learn to recognize potential danger and not to panic when it happens. The most important thing is to follow the safety instructions of the relevant authorities.

Civil security helps economic entities, companies, and residents to prepare for emergency situations, provides assistance in the event of threats, and helps to liquidate their consequences. When a state declares a state of emergency, additional forces, such as the military, can be called in to help. This is regulated by the Civil Security Law of the Republic of Lithuania.

In Lithuania, the management of emergency situations has not been widely studied. Pitrėnaitė and Survila [1] were interested in and analyzed this topic. Pitrėnaitė described theoretical aspects and their practice in Lithuania. Outside our country, this topic is much more widely analyzed, there are many books and scientific articles. Farazmand [2] published a book, a manual on crisis and emergency management. Farazmand [2] published a much more informative work in which he described not only the theoretical aspects of crisis and emergency management but also the practice. McEntire [3], Administrator of the Division of Emergency Management and Public Administration Planning, provided a very informative research article. The article is about the state of emergency management, which describes in detail the problems, obstacles, and the improvement of the state of emergency management. Other authors have written on this topic. The authors have published an Introduction to Emergency Management. This book is more student-oriented and looks at the misunderstood and overlooked aspects of social disasters. Experience in international emergency management is described here.

The study topic is relevant because in recent years our country has faced many extreme situations, conflicts with neighboring countries, when military assistance was requested. Therefore, it is important to define what help and what resources the Lithuanian army uses in an emergency situation. It is important to mention that the soldiers of the professional

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military service organize searches for people, provide the country with its defense, and help eliminate the consequences of various pollution incidents. They provide assistance to the police, fire protection and rescue department, state border guard service, etc. New threats can create new challenges.

Method of investigation. The aim of the work was to analyze the use of the resources of the Lithuanian army for the management of emergency situations. To achieve the goal, literary sources and scientific articles were analyzed, based on which the necessary rescue measures are determined to liquidate the emergency situation. To evaluate the use of the Lithuanian army resources during an emergency situation, an expert and quantitative study was conducted. After conducting these studies, it was determined what difficulties were encountered in analyzing the specific emergency situation in Radviliškis, when in 2016 there was a fire in the fuel pellet factory. After systematizing the information received from the respondents, recommendations are made on how to avoid emergency situations and improve their management.

To achieve the purpose of the investigation and evaluate the use of the resources of the Lithuanian army during the emergency, an expert research method was chosen to find out how the fire in Radviliškis was extinguished and how the resources of the Lithuanian army were used. Furthermore, to achieve the purpose of the study, a quantitative research method was chosen, which identifies the need for resources of the Lithuanian army in liquidating emergency situations.

Investigation Results. Summarizing the data of the respondents, it can be said that the Lithuanian army soldiers and helicopter help contributed to the closure of the emergency situation in Radviliškis in 2016, but there was a lack of additional human resources and special techniques.

After systematizing the answers provided by the respondents to the questions about the need for the Lithuanian army to extinguish the fire, they confirmed that it was necessary to use more soldiers of the Lithuanian army (80% of the respondents) and that it was also necessary to use the Lithuanian army's special forces. equipment (forklifts, excavators, etc.) (74% of the respondents). Based on the Kruskal Wallis test, it became clear that the statement "More soldiers of the Lithuanian army would be used" was more agreed by the respondents who belonged to the group "Seniors" that "It would be useful to have a Lithuanian army special. Machinery (loaders, excavators, etc.)" was statistically significantly more approved by the respondents representing the group "Team senior". Respondents whose experience was between 1 and 5 years. statistically significantly more agreed that "One more helicopter was needed to fight the fire" when extinguishing the fire.

Conclusions. After conducting the research and analyzing the scientific literature, it became clear that each emergency situation requires separate preparation and management. The response is the main phase of emergency management, while the recovery phase is the assessment of the damage caused.

The data obtained during the quantitative investigation reveal that the necessary amount of possible Lithuanian army special equipment was not used to liquidate the emergency situation. In addition, it can be pointed out that technical and greater human resource assistance would be more helpful in such situations, as soldiers are rescuers who have the potential for "nonmilitary" problem-solving methods, such as disaster relief and emergency

response. Moreover, the Lithuanian Armed Forces have a wide selection of specialized equipment, as well as physically and psychologically well-prepared personnel.

Keywords: *Lithuanian army; civil protection support; State Border Guard Service; semi-structured expert interview.*

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Methodological Approaches to Assessing the Quality of an Organisation's Performance

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Introduction. In line with the principles of modern management [2, 9, 10], it is essential to assess the quality of an organization's performance. Performance evaluation is a dualistic process [11] which involves self-assessment and external evaluation. Depending on the culture, traditions, internal structure, and size, etc. of each organisation, quality assessment is carried out using different methodologies [12], with conclusions based on quantitative and/or qualitative data. Often the collection and analysis of data becomes a routine and inert activity, turning the evaluation process into an end in itself. The lack of reflexivity in the evaluation process steadily reduces the perception of the meaningfulness of individual management cycles by focusing only on the implementation of individual management functions, thus undermining the internal sustainability of the organisation.

One of the problems is the lack of reflection on the meaningfulness of an organisation's performance evaluation processes, leading to inertia in performance evaluation. A discussion of the methodological approaches to assessing the quality of an organisation's performance can help to address this problem by answering some of the meaningful questions that help to understand the importance of quality management in an organisation, both at the individual and at the organisational level.

Therefore, the focus of this paper is on methodological approaches to assessing the quality of an organisation's performance. The aim is to present methodological approaches to assessing the quality of organisational performance. The paper focuses on action research as a methodological approach to evaluation and case studies as a methodological approach to external evaluation, showing how the two are closely interrelated and how they can be used more frequently and successfully in quality management research.

The article was prepared using the method of summarizing scientific and methodological literature.

Investigation Results. A didactical analysis of the assessment process shows that, in a dualistic, complementary process, the evaluation processes are more closely linked to the formative assessment objectives, and the external evaluation - to the diagnostic assessment objectives. This conditional differentiation of the evaluation process makes it possible, with some distance from the variety of evaluation models and historically conditioned evaluation

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approaches known in management science [14], to approach evaluation from the perspective of research methodology and to draw the conclusion that the processes of evaluating organisations' performance should be organised in accordance with the methodological approaches of action research, and those of external evaluation, with the methodological approaches of case studies.

Action research is research in which the researcher (i.e., a member of the community/ organisation) is directly involved and determines the situation, and the methods used are mainly qualitative (interviews, observation, document analysis, etc.). According to Fernie and Smith [5], a distinctive feature of this research is that it focuses on examining and improving professional performance. In this process, it is important to investigate different aspects of performance and propose solutions to improve performance. The methodological literature [3, 8] emphasizes that the value of research constructed using this methodological approach is that it is a social process in which the research is carried out in the presence and involvement of the researcher in the activity being researched, with all members of the organisation interacting with each other, sharing their knowledge and experience, learning together, and seeking social change. This methodological approach is closely related to and directly reflects the PDSA cycle in quality management.

In action research, it is important to collect data and information to help identify those aspects of the facility that need improvement [1]. In such evaluation, it is important to understand whether the processes are working as planned and whether progress is being made as planned [15]. As Alkin [1] argues, the information generated by the evaluation feeds back into the object being evaluated and helps improve it. According to Stufflebeam and Coryn [14], evaluation is proactive and forward-looking, not only helping to achieve the set objectives, but also enabling the achievement of higher objectives, and enabling continuous quality improvement decisions to be made with the participation of all stakeholders related to the object of evaluation.

Action research aims to change both practice and theory. Action research treats both practice and theory as equal; neither theory nor practice is given priority. Theory provides additional knowledge, suggests ideal models, and indicates aims for practice. Practice gives meaning to theory or promotes change in theory, enriches theory with examples, etc. The dialectical relationship between practice and theory is important in action research.

It is important to note that proper and meaningful self-assessment in an organisation provides an excellent opportunity for learning by accumulating knowledge of the lessons learned, allowing staff and the community to use it to plan future activities. It should also be noted that self-assessment is directly related to the idea of a learning organisation [13].

In addition to the advantages mentioned above, the methodological approach to action research in the context of self-assessment should also take into account the threats and disadvantages identified in the methodological literature that can disrupt the assessment process itself or affect the results: time costs for the participants, low technical quality of the assessment, and unfavourable political configurations.

A case study provides an opportunity to analyse and describe a single event or fact in depth in a real context and to describe/explain the phenomenon being researched [4, 7]. This type of research combines both quantitative and qualitative methods of data collection and processing. The methodological literature [6, 7] indicates that case studies are widely used in

organizational performance research. These studies focus on a specific case, which they try to describe and explain in as much detail as possible.

According to Hamilton and Corbett-Whittier [6], a good case study is characterised by a clear and justified purpose and carefully formulated research questions. An external evaluation based on the methodological approach of a case study should first establish the direction and purpose of the study and refine the research questions. This would be followed by a focus on data collection tools and practical issues, the implementation of data collection and data management. These authors referring to quality case studies place additional emphasis on rich data collection, where data can be collected in an intensive but short time frame. It should be noted that the use of different tools and methods adds depth to the data, helps to break down the data, and strengthens the validity of the conclusions drawn.

A case study provides an in-depth analysis and description of a single event or fact in a real-life context, and a description/explanation of the phenomenon under investigation, especially when the boundaries between the phenomenon and its context are not clear. However, the members of the organisation are indirectly involved in this process. The essential steps of the research are determined by the researcher and the aim of the research. Therefore, in addition to the advantages mentioned above, it is important to consider the potential threats and obstacles [4]: the difficulty of selecting the most appropriate case and defining the boundaries of the selected case; the need to make a reasoned decision on how many cases it is sensible to analyse; the risk of lack of depth of the analysis if one chooses to study several cases instead of a single one; the need to gather a large amount of empirical material for a deep understanding of the case; the need to use a variety of methods for collecting the data; and others.

Conclusions. The analysis of the methodological paradigms allows to argue that action research as a methodological approach to evaluation and case studies as a methodological approach to external evaluation are closely linked to organisational quality management. It is argued that action research is a critical, reflexive social process, in which the researcher and all members of the organisation are directly involved and determine the situation. Action research is important in quality management because it gathers data and information to help clarify those aspects of the object evaluated that need improvement. The self-assessment becomes a precondition for organisational learning, identifying gaps in performance, challenges, and obstacles to improving the quality of the organisation's performance.

Case studies provide an opportunity to look closely at a single case and analyse it in the context of one specific case. However, case studies based on empirical data and analytical methods allow for an in-depth analysis and description of a single event or fact in a real context. This study, unlike an action research study, does not directly involve the members of the organization, making it more suitable for an external evaluation of the organisation.

However, these methodological approaches should not be considered perfectly suitable in all cases, as they have limitations. The following risks or drawbacks can be observed when using the action research approach: the time commitment of the participants of the self-assessment, the low technical quality of the evaluation, the unfavourable political configuration, the excessive reliance on theory, and the neglect of practice. The fundamental weaknesses of the methodological approach of case studies are related to the selection of appropriate cases, the lack of supporting evidence, the need to use appropriate research methods, the incompetence of the researcher, etc.

Keywords: *quality assessment; self-assessment; external evaluation; action research; case study.*

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Success/Leaving Rate of the Military Students

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Introduction. In times, when smaller or larger war conflicts occur more often in the world, the role of the army is growing significantly. The army of the Czech Republic is no exception. The higher education of military officers is guaranteed by the University of Defence [1]. The university provides accredited education in Bachelor's, Master's and doctoral degree study programs, which are oriented to military management, engineering and medicine. The priority is to prepare military professionals working in the sphere of security and state defense based on the needs of the Army of the Czech Republic, state administration and contractual commitments with other democratic states. University graduates are prepared to work in units deployed abroad in missions and NATO operations as well.

The university consists of three faculties, two institutes and three centers. In our contribution, we focus on the Faculty of Military Leadership. Until 2013, the so-called "3+2" study program was accredited at the faculty, i.e. a three-year bachelor program followed by a subsequent two-year master program. For practical reasons, it has been replaced since 2014 by a five-year master program, with the emphasis placed on a broader focus of the graduates' professional profile, which enables their career growth in the changing military environment.

Education at the University of Defence provides students with a comprehensive range of knowledge enabling them to handle activities in the field of command and management. During the five-year course of study, students fulfill demanding requirements of theoretical and professional subjects as well as of their military training, which is implemented as a part of their studies. Not everyone successfully completes their studies. This led us to the idea of evaluating the success/leaving rate of the study and use the results to predict the students' leaving rate.

Limitations. The study is limited to the students of the Faculty of Military Leadership (University of Defence, Brno, Czech Republic). Data availability is our main limiting factor, only the first three years of the study program are completed by all students. Moreover, for each leaving student only the official date of their leaving is known but not reasons which led to their decision.

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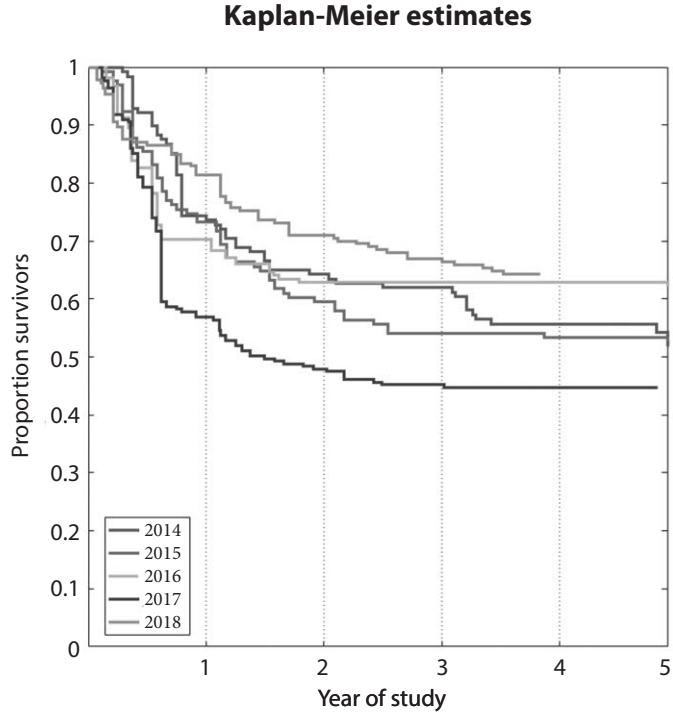
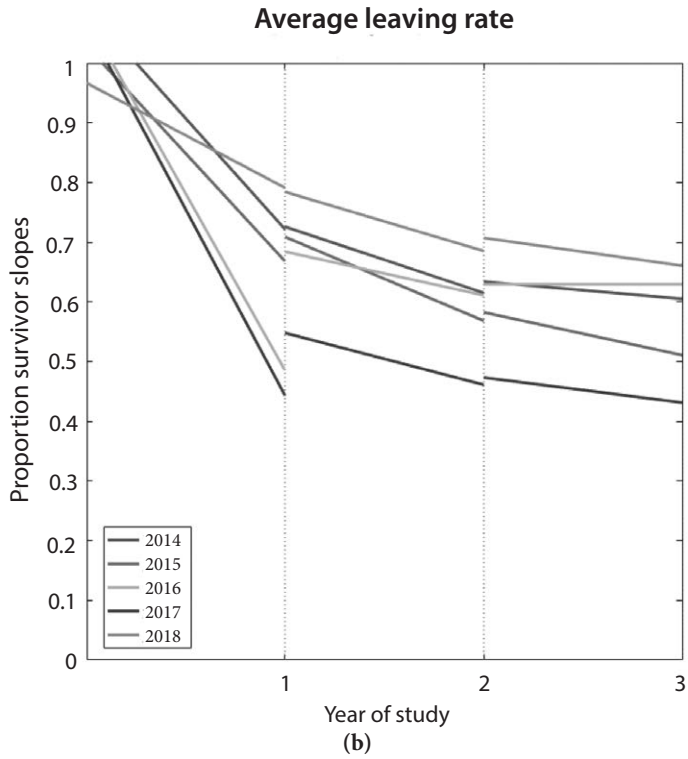
Methods of investigation. We used several scientific research methods to assess the success/leaving rate of the military students. First, the data collection, which was followed by the data transformation to the percentage scale and the time axis was converted to days counted from September 1 of the respective years. Next, we analysed the data by statistical methods: Kaplan-Meier estimates of survival functions, regression analysis in its parametric and non-parametric form, functional data analysis. Comparison of the respective groups was done using the analysis of variance [2,3].

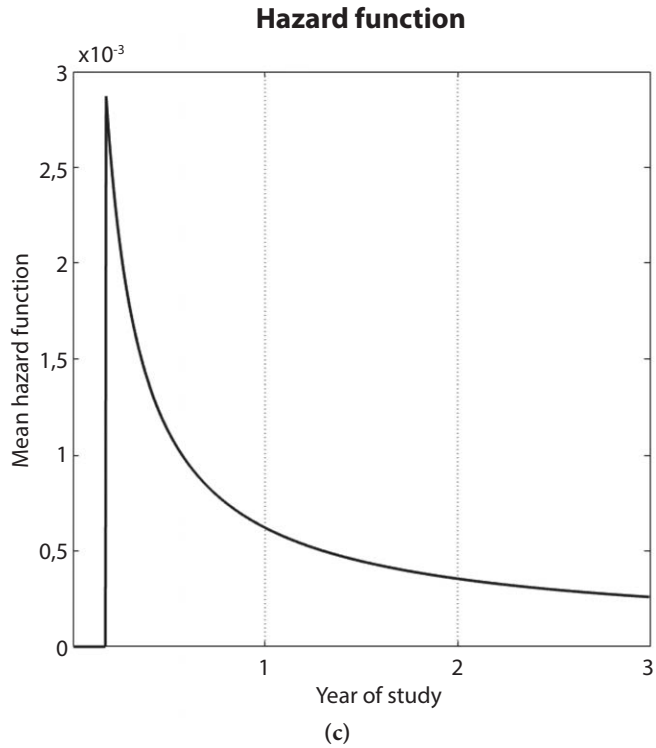
Results. The survival functions of the respective study groups were calculated using the Kaplan-Meier estimate. In Fig. 1(a), the estimates of all study groups are presented. From the graph it is obvious that the first years is the year with the highest leaving rate and then the slope of the rate is getting flatter as can be seen from Fig. 1(b). Results of the analysis of variance show that the slopes in the first year of study make up three groups, namely the class of 2014 and 2015, the class of 2016 and 2017, and the class of 2018. Applying the functional approach lead us to the parametric estimate of the mean hazard function for all the classes, which is depicted in Fig. 1(c). The average "starting time point" of the students leaving is two months after the beginning of the academic year.



(a)



(b)



(c)

Fig. 1 Results for classes 2014 (blue), 2015 (orange), 2016 (yellow), 2017 (violet) and 2018 (green); **(a)** the Kaplan-Meier estimate of the survival function; **(b)** average leaving rates during the first three years of the study; **(c)** numerical estimate of the mean hazard function for all classes.

Conclusions. The outcomes of this study show that the first year of the study is critical for the students and their decision to leave the university. Even if the data themselves do not contain the information about the reason of leaving, we can presume that the first wave of students leaving during the first semester is influenced by the discrepancy between the students' idea of the university studies and the reality. The second wave is emerging at the beginning of the second year of study due to failure to fulfill the first year study requirements. However, after the first critical year, the leaving rate decreases substantially.

Based on the obtained results it seems, from a pedagogical point of view, highly important to pay increased attention to the students in the critical time period and to motivate them more to study. The study shows only limited results, since the data are not complete. The whole five-year cycle will finish in July 2023 and after that the full data set will be available. We assume to continue with this study and provide a model for assessing the overall leaving rate and identify the critical time points of students' possible leaving.

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Keywords: *military students; university; leaving rate; survival analysis; regression; hazard function*.

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The Problem of Artificial Neural Network Retraining and Its Use to Improve the Quality of Teaching

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Introduction. Artificial neural networks have gained considerable practical application in recent years in terms of data processing, statistical analysis, and data classification. At present, a large part of the information flow for neural networks is graphical data; therefore, it is necessary to have a network structure that processes large amounts of information, learns and further tests with maximum accuracy and will be able to detect indicators close to the observed accuracy during the testing process. It should also be noted that all the above-mentioned is currently achievable for neural networks with almost all architectures, but this is done either by increasing the complexity of the network or by the uncontrolled growth of the training process and the amount of data to be learned. The accuracy obtained due to the architectural complexity of the network is in some cases accompanied by the problem of overfit [1-2], which is why the neural network at the last layer periodically gives us a slightly different meaning in the final stage of comparative analysis of the test data and the data to be learned. To avoid the problem of overfitting, they increase the database for network training by processing each new piece of information, thus increasing the duration of the learning process, and the network receives so much information from each new material processed that it can no longer sort relevant and irrelevant information. During supervised training [3,4], similar problems are seldom if ever encountered. In this case, the neural network goes through the learning process in a database where each object is accompanied by a Category Definition Label, and during the learning process, the connections, weights, and strengths of each subsequent layer from each neural layer are determined and memorized, and the desired value is indicated on the output layer, on the basis of which the neural network studies and classifies the object (supervised training) [3,4]. However, this type of teaching method is often insufficient and ineffective when dealing with any new (non-database) information to be processed, while the idea of a neural network is to make decisions based independently on intelligence and network architecture.

Method of investigation. With all this in mind, it is necessary to have software that, based on statistical analysis, not only terminates or evaluates the learning process but also determines the optimal neural network structure based on the data to be processed and selects the appropriate one from the neural network class.

To illustrate the problematic part of overfitting, it suffices to present two polynomials whose components are constants and free members. Different polynomials have a line of different

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shapes, and the so-called power numbers in front of the variables have a large influence on this line. Suppose that we have data (points on a graph with certain coordinates) that we want to match to a polynomial graph. A low-order polynomial is unlikely to be sophisticated enough to capture all the desired points. A high-order polynomial is formed in such a way that, because the eccentric shape changes, the chance of approximating the graph with all the given coordinates is much higher. Of course, different qualitative polynomials complicate things and become more complex in terms of calculation. We have the same process with respect to neural networks. The more complex the architectural structure of the neural network, the more accurate the solution for any particular group of objects, but the same accuracy can be achieved for another type of object with a much simpler structure. In other words, it is possible that the single A neural network we use to classify N-type data does not necessarily require as deep complexity for all types of objects as for any particular i (i belongs to n). After solving the problem of overfitting and learning, they mainly try to use different types of learning mechanisms and activation functions to improve the accuracy of the test reports. Nowadays, when talking about artificial intelligence, software packages intended for classification of graphic images are the most functional and widely used, but the problem of overfitting and overlearning also manifests itself here.

Investigation results. In order to minimize the problems caused by the above, the neural network architecture, activation functions, methods for calculating hidden layers and weights, and methods of learning mechanisms have been constantly developed and have been giving new opportunities. Based on a series of experiments conducted in the course of our research, it was found that while processing graphically presented data, it is possible to divide the information provided by categories according to changes in contours, trajectory, and color gamut in any other type of category, which raised suspicions that in the process of learning the CIP it was possible to divide the learning data into different groups according to the object. In order to understand the practical value of this theory, a number of experiments were conducted using the MNIST [3] database. The database was divided into 10 subcategories where the objects located in each category were assigned LABELs. 80% of the base was allocated for the neural network learning process, while 20% included the most dramatically different images of the testing processor. A total of 11 neural networks with identical structure were created. A standard monitoring type of data was studied in the MNIST database on one of the neural networks and 96.7% accuracy was achieved. The other 10 neural networks were trained on the corresponding graphic data of only one specific number. It should also be noted that each neural network had 10 identical neurons represented in the output layer. The experiment showed that each neural network, which was provided with a graphic image of its subgroup in the form of data to be processed during texting, returned the activation value with 99.3% accuracy. Although any particular neural network will still give a high value of activation (which would certainly be wrong) by processing unknown data, but due to the importance of the COST function [3], the learning process will not take place and the program will automatically transmit the same image to the next neuron. Consequently, there will be not permanent but selective learning which will drastically improve both the neural network testing and learning process and minimize cases of overfitting.

Keywords: *Neural networks; information flow; architectural complexity of the network; statistical analysis*.

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The Impact of Psychological Resilience on Soldier Performance in the Lithuanian Armed Forces

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Introduction. Today, the Lithuanian Training and Doctrine Command (LTDC) is focused on individual training of Lithuanian Armed Forces soldiers and the formation of personnel training for the national defense system. From LTDC's point of view, the military doctrine guidelines define all conditions regarding perspectives related to military ethos and identity. Thus, the identity of a Lithuanian soldier is based on traditional values such as altruism, patriotism, and nationalism. Despite the fact that this identity is described in a similar way as in the military doctrines of other countries, it should also be noted that a lot of attention in the Lithuanian military doctrine is focused on the professionalism of the soldier, which is not only a desirable trait, but very important and necessary to justify the identity of a soldier in the Lithuanian Armed Forces (LAF). So, to a large extent, LTDC is in control for the regulation and evaluation of collective training and combat readiness of military units.

Thus, we can say that it is very important to consistently define and measure the professionalism of a soldier, as this could potentially help us to provide new insights into its formation and contribute to the formation of a new instrument for the selection of armed forces leaders. Today, high demands are placed on commanders, as they must be especially well prepared to make quick, appropriate decisions in difficult situations and, at the same time, be able to lead and lead soldiers into battle. These requirements arise from the unique characteristics of the military management structure and the tasks assigned to military forces and units, the main of which, among many others, is the readiness to defend the homeland. The Lithuanian Armed Forces must be able to perform tasks not only during peace, but also during conflict, to achieve national security goals.

Consequently, it can be said that if the soldier's professionalism could be reliably defined and measured, it would be possible to provide new insights that could significantly contribute to the formation of a new instrument for the selection of commanders of the armed forces. However, today there are still too few reliable empirical studies in the Lithuanian army that could clearly confirm the predictive or causal validity of the soldier's identity. Thus, such a situation exists because there are not enough relevant empirical studies conducted in the Lithuanian army, the results of which could be used to substantiate the variables of professionalism, and also partly because there is a great lack of objective measures of the soldier's professionalism.

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Consequently, it can be argued that if soldier professionalism could be reliably defined and measured, it could be provided the new insights that could significantly contribute to the development of a new selection tool for armed forces commanders. However, today in the Lithuanian army, too few reliable empirical studies have been carried out, which could clearly confirm the predictive or causal validity of the soldier's identity. Thus, this situation is due to the fact that not enough relevant empirical research was conducted in the Lithuanian army, and today there are no the results which could be used as a base for the measurement of soldier's professionalism.

Therefore, the review of the literature allows us to conclude that for any army, the question is how to identify and understand the objective measures of the soldier's professionalism and its specific characteristics that can help militaries develop the right competence and other qualities in educational institutions and throughout their career, from the junior to senior commander strategy. The present study aimed to fill this gap.

Method of investigation. To achieve the results of this study, quantitative research was conducted. The study was carried out using traditional paper questionnaires presented in the Lithuanian language. The data was collected in the Lithuanian Armed Forces in 2022. Military units and soldiers were selected using random sampling to represent the general population of active military personnel reserve soldiers in the Lithuanian Armed Forces. The purpose and importance of the study were introduced to the study participants. Additionally, the anonymity of the respondents was preserved.

Investigation Results. Reservists' achievement of military competencies was assessed in terms of psychological resilience, achieved military training competencies, and three other psychological measures such as effort, activity, and self-efficacy [1-3]. Consistency of interests and persistence was studied after reservists' new experience, at the end of military training. The construct of proactivity was included in this study to improve understanding of the effect of proactivity on perceived training outcomes. Self-reliance was chosen to show the importance of the psychological growth of soldiers after completing military training. The soldiers' psychological resilience was also measured to understand how well the soldiers cope with psychological stressors. Confirmatory factor analysis (CFA) was used to examine the structural construct of our measures that represented the military performance identity. The results showed that all indicators loaded significantly on their assigned factors, confirming the convergent validity. Discriminant validity was evaluated by comparing the baseline model with alternative models. Two models were constructed to test all hypotheses developed for direct and indirect relationships between latent variables. The study results showed that the designed model structure fit the data ($\chi 2$ (1) 0.116, $p < 0.01$, RMSEA 0.007, NNFI 0.92, CFI 0.99), indicating that the four main constructs can be used for future investigations as measures for evaluating military performance identity.

Conclusions. The results of the study showed that the Lithuanian army is indeed focused on motivating its soldiers. The potential of reservists in military units makes it possible to achieve a higher level of readiness and successfully carry out tasks, but the training of reservists needs to be improved taking into account psychological aspects. Therefore, the area of new research on the impact of military identity on effectiveness should include social and organizational identification constructs.

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Keywords: *Lithuanian army; military performance; effort; activity; self-efficacy; psychological resilience.*

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CHALLENGES TO NATIONAL DEFENCE IN CONTEMPORARY GEOPOLITICAL SITUATION

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