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CONTENTS

THE DESIGN OF A DIDACTIC GAME (CIP-v.01-THD) FOR CRITICAL INFRASTRUCTURE SECURITY MANAGEMENT

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The motivation of addressing such a topic has as argument to ensure, educationally speaking, the best connection to the real aspects of critical infrastructure issues. We considered that there are postgraduate training programs at national level, which must implement case studies, in view of achieving the purposes resulting from the curriculum, as close to reality, by replicating some sensitive aspects of the relevant decision, which meet the training needs of students, in accordance with occupational standards. Being a complex area, the challenge is to best select the most relevant aspects to be played in terms of teaching, in a manner beneficial to the finality of integrating the system, technical and operational perspectives.

Key words: *critical infrastructure, security, education, game*

1. GENERAL CONSIDERATIONS

While exploring reality differently, at least two examples of best practices can be mentioned that were the inspiration in the field of security and defense in this case, made in prestigious educational institutions.

Internationally, the USA, at the Naval Postgraduate School, there is CyberCIEGE game [1] that includes tutorial movies illustrating information assurance concepts explored by the game, from one simple training sequence (How do you know if the system is secure?) to a complex end (Deciding who we are willing to communicate with, and the protection we want for that communication).

At national level, at the Regional Department of Defense Resources Management Studies (DRESMARA) there is an application of Defense Planning and Defense Resources Management - The Republic of AMRA, by which the translation of theoretical concepts is achieved,

from strategic to operational level, starting from a specific situation given by the regional security environment, for hypothetical states. For a substantial framing of this topic, a broader concept should be considered, that of serious games, explained since 1970 by studies conducted by Abt, C.C. [3], a precursor of the domain, as follows: "*These games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement. This does not mean that serious games are not, or should not be, entertaining." We can define game in a more conventional way as follows: a game is a context of rules where a group of rivals try to achieve their goals. We are interested in serious games because they are fun and have an explicit educational purpose which has been planned carefully*". For the 21st century, according to IT technologies, the simulation part is increasingly associated to the concept (fig. 1), achieved using the dedicated software. The classical, non-computerized component is approached in this paper, insisting on the transfer of expertise in the field concerned.

Fig. no. 1. *Content of the serious games concept* [4]

2. THE SOLUTION PROPOSED

The game is intended to be applied to laboratory and workshop activities for subjects in the area of critical infrastructure (CI abbreviation will be used). Two teams of 5-6 students are formed, whom are distributed a worksheet (Table 1) with the initial situation (the same) of the level to ensure the protection of critical infrastructure (ps% abbreviation will be used), based on the assumption that a 100% level of assurance cannot actually be achieved.

Table 1. *Initial situation regarding critical infrastructure security*

IC	Transports (T)	Energy (E)	Communications and IT (C)	Health (H)	Water supply (W)	Chemical industry (Z)
ps%	90	92	93	90	91	92

Presentation of the initial scenario (**step 1**) can be done using a written format or through a report distributed via a video or combined display to achieve a high degree of awareness of the situation, depending on the level of training, professional experience, expertise in the field, etc. (fig. 2).

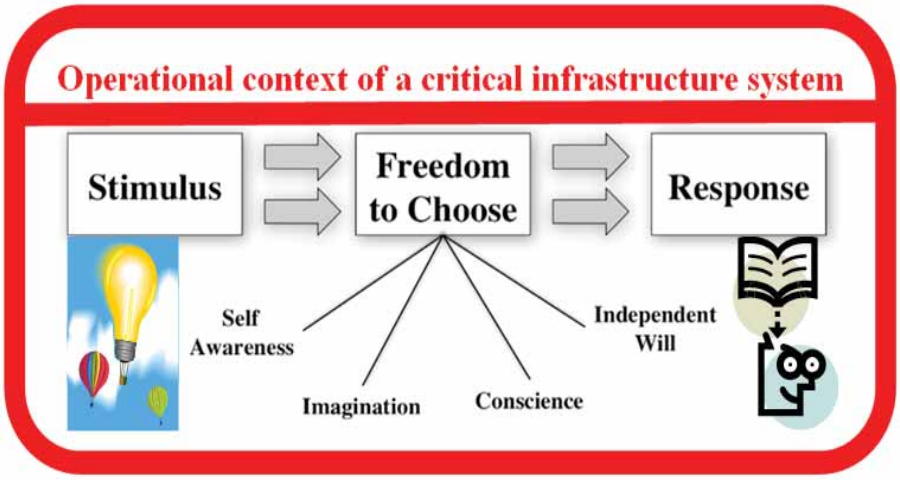

Fig. no. 2. *The general approach to a critical infrastructure situation* (adaptation after [5])

Such an example of content may be as follows.

Theodoria region is located in the central part of the XLand state, constituting a national development engine. With an area of approximately 1,500 square kilometers and a relief mostly piedmont, crossed by two rivers with an average flow rate on which a local hydroelectric power station was established (at the confluence), the region is crossed by a railway line and a national road connecting three urban settlements. In the regional development strategy for the period 2015-2025, the merging of certain rural settlements is provided, to become neighborhoods of major existing cities, in a general framework of strengthening the economic, social and political independence to neighboring countries characterized by fragile security environment. This would also strengthen efforts to redevelop flood embankments given some physical and climatic events occurred in the last two years, especially during mid-spring. Moreover, it is intended to start modernization projects of the water supply plant and Chemical XSA factory within the area, both being constructed 40 years ago, as an integrated system, given the need for water flow cooling of special equipment of the factory. Currently, representative for the region are the public radio and a large private television specialized in news and political-military analyses, the regional hospital and services in the area of alternative energy and IT, the solutions provided by the latter on a contractual basis to the local authorities and the Committee for emergencies being a real success, recognized for the performance.

To create an image with a better perception of the initial situation, a map was carried out, using ArcGIS environment (fig. 3).

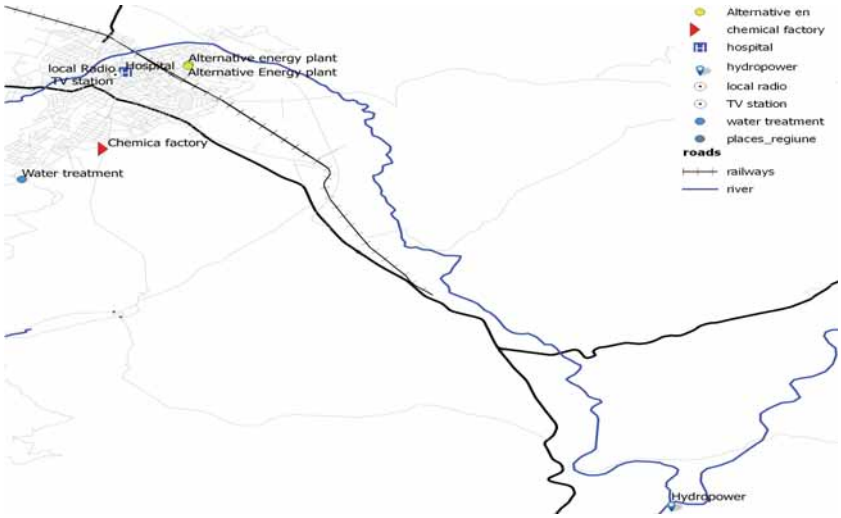

Fig. no. 3. *Modeling of initial core elements through ArcGis software*

After disclosing the scenario, the two teams will be assigned the necessary time (approximately 30 minutes) to establish responsibilities and the preliminary analysis, focusing on highlighting interdependencies of identified critical assets. Depending on the complexity sought to be replicated, teams will be formed (training targets), the optimal solution to this situation being to have one responsible for each critical infrastructure sector (see table 1) and a general manager of security. Students are free to take roles within the team and will carry out the activities in different rooms, the instructor monitoring the activity.

Further on (**step 2**) it is announced, based on the history of previous risk events specific to the region and the given current context, the possibility of the occurrence in the future of threats. For example, we chose this: flooding due to heavy rainfall regime caused by a major storm, code red for a day (36%); escalation of conflicts on the southern border with the use of cyber-attacks against the administrative center of the region (30%); a storage facility explosion of liquid ammonia from the chemical plant (34%). These are the three events that will be considered, in random order, explaining the specific context of the event. Teams have 15 minutes after announcing a preliminary analysis of possible situations to take action (what if) on the structure of infrastructures, given the existing level of security.

Subsequently, it is explainable that they have at their disposal a credit of 20 useful (values of the

measures that will need to be applied after the manifestation of each threat, to increase security of managed infrastructures), gradually (no more than 7 for each stage) and not more than 4 for a critical infrastructure. Security arrangements must be applied to each stage at least for three infrastructures.

It is shown that the exercise's score will be calculated according to the level of performance achieved in securing critical infrastructure by the formula:

$$\mathbf{PS} = \mathbf{T} * 0{,}08 + \mathbf{E} * 0{,}20 + \mathbf{C} * 0{,}35 + \mathbf{H} * 0{,}15 + \mathbf{W} * 0{,}12 + \mathbf{Z} * 0{,}10$$

wherein the values of T, E, C, H, W and Z are those in the worksheet at the end of round three. On equal scores of the two teams, the tie-break criterion will be the score achieved at the end for C.

There is, from **step 3 (45 minutes)**, the introduction of threats. For the first round, threat number three will be replicated, as follows: on April 5th, 2017, at 12.12 there was an explosion in a tank for storing liquefied ammonia from the chemical plant, following the execution of maintenance operations without full compliance with standard operating procedures and due to overload. According to preliminary data provided by the radio station, 30 people died and over 175 were seriously intoxicated and an area of 2.5 km^2 was contaminated. The committee for emergency situations called for the mobile team of volunteers to supplement the efforts of the medical team and for the local transport administration to replace reconstruction efforts after the event, by providing means of transportation, and it warned about the consumption of water for the population. The teams have received the first incident, analysed it and took the necessary actions (15 minutes) to increase the security of critical infrastructure (Table 2), based on all data provided in the three stages and the perception of events.

Table 2. *Situation regarding critical infrastructures security after the first incident*

IC	Transports (T)	Energy (E)	Communications and IT (C)	Health (H)	Water supply (W)	Chemical industry (Z)
Team *I*						
ps% 1	90	92	93	90+2	91+2	92+3
Team *II*						
ps% 1	90+1	92	93	90+1	91+1	92+4

For the second round of stage number three, teams are put before the following situation. Heavy rain which brought up to 90 liters per square meter caused a flood in central region, the hydroelectric energy station operating on emergency procedure due to the alarming increase level in the water storage tank. Amid the rain storm and lightning, the north wing of the hospital was caught by fire that forced the relocation of patients in other areas of the hospital unit. Adverse weather conditions caused the collapse of the three pillars of electricity, public radio station, water treatment and 568 households remained without power for four hours. In a short time, firefighters, aided by the engineer battalion in the region have put in place several motor pumps and a machine to help strengthen a dike. The intervention with special vehicles for firefighting and first aid to flood victims was hampered by the mostly impracticable state of the county road. Measures implemented by both teams led to the situation presented in Table 3.

Table 3. *Situation regarding critical infrastructures security after the second scenario*

IC	Transports (T)	Energy (E)	Communications and IT (C)	Health (H)	Water supply (W)	Chemical industry (Z)
Team *I*						
ps% 1	90	92	93	90+2	91+2	92+3
ps% 2	90+1	92+2	93+2	92+1	93+1	95
Team *II*						
ps% 1	90+1	92	93	90+1	91+1	92+4
ps% 2	91	92+3	93+3	91	92+1	96

For the second round of stage three, teams are faced with the scenario of a cyber-attack. Given the deterioration of external security environment, intended to attract in Theodoria conflict region, on the weekend preceding the National Day celebration, through intensive and extensive information actions, websites of central government of the private television were affected, their networks being temporarily taken out of service. The television's servers were blocked and as for the electricity supplier, the automated management systems of semi-active redundant operation have stopped working. At the regional hospital administrative activities that required the use of the computer networks were now made on paper and C4 network with the emergency committee is inoperative. Critical infrastructure security measures operated by the two teams led to the situation presented in Table 4.

Table 4. *Situation regarding critical infrastructures security after the third scenario*

IC	Transports (T)	Energy (E)	Communications and IT (C)	Health (H)	Water supply (W)	Chemical industry (Z)
Team *I*						
ps% 1	90	92	93	90+2	91+2	92+3
ps% 2	90+1	92+2	93+2	92+1	93+1	95
ps% 3	91	94+1	95+4	93+1	94	95
Team *II*						
ps% 1	90+1	92	93	90+1	91+1	92+4
ps% 2	91	92+3	93+3	91	92+1	96
ps% 3	91	95+1	96+4	91+1	93	96

Applying the calculation relationship of the final security level, we obtain:

$$PS\,I = 91 * 0{,}08 + 95 * 0{,}20 + 99 * 0{,}35 + 94 * 0{,}15 + 94 * 0{,}12 + 95 * 0{,}10 = 95{,}81$$

$$PS\,II = 91 * 0{,}08 + 96 * 0{,}20 + 100 * 0{,}35 + 92 * 0{,}15 + 93 * 0{,}12 + 96 * 0{,}10 = 96{,}04$$

Hence it results that the team won.

In **step 4 (10 minutes)** the reunion of the two groups in a common room, displaying the game tables and the debriefing takes place. The general manager of security at every team will be the one to briefly present, the mode of action and the justification of the measures taken.

3. REAL PROSPECTS ENVISAGED FOR APPLICATION

In the *National Defence Strategy for the years 2015/2019*, critical infrastructures are mentioned in the "*expanded concept of national security, based on constitutional democracy and mutual respect between citizens and the state, aimed at interests converging towards national security, manifested in the following areas: defence (as understood in double normative quality, national defence and collective defence), public order, intelligence, counterintelligence and security, education, health, economy, energy, finance, environment, critical infrastructure*". [6] At the same time, one of the national security objectives, from the internal perspective, aims at strengthening security and protection of critical infrastructure: energy, transport and cyber and food security as well as the environment. In addition, for the course of action - the dimension of intelligence, counterintelligence and security, identifying and reporting deficiencies in the optimal functioning of critical infrastructure is also aimed.

The Guide of National Defence Strategy of the country for the period 2015/2019 [7] defines critical infrastructure as: devices, networks, services, systems of material goods (energy, transport, communications and information technology, supply with utilities) of strategic interest and/ or public utility, whose destruction, non-operation, damage or disruption could have major negative effects on national or regional level, on the health and safety of citizens, the environment, economy and operation of state institutions.

The models and simulations on critical infrastructure security can be used to understand these infrastructure systems, their interrelationships, their vulnerabilities and the impact of spreading consequences in interdependent infrastructure systems, based on incidents in emergency situations.

For this paper the essence of the concept of modeling was taken into consideration, as a process that produces a model, which is a representation of the construction and operating mode of a certain system of which we are interested. As a defining element, a model should be essential for the real system, should include as many of its important characteristics and should not very complex so that it is not understood and so that it cannot be experienced by rules, players and resources.

4. CONCLUSIONS

In terms of elements of originality and novelty, the paper contains, at least at national level, the focus on educational aspects of critical infrastructures' security, since there are three military educational institutions ("Nicolae Bălcescu" Land Forces Academy, "Carol I" National Defense University and "Mihai Viteazul" National Intelligence Academy, which have in their educational offer programs dedicated to this issue. Previous research is therefore continued [8] coordinated by the author, in which general aspects of education and training in the field of critical infrastructure security were addressed.

This version of the educational game will be improved after comments from teachers and instructors who will carry out teaching activities. A proactive character may be considered, since a reactive component can be noticed in the current design. Moreover, in determining the final result (the winning team), it would be desirable to find a way to emphasize the final exposure of solutions experienced during the exercise.

Not at the least, corresponding to the required development level of this teaching game, it could be used Joint Exercise Management Module,

a planner tool for structuring military exercise and defining action timing, extensively used for training in simulation of all kind of crisis management scenarios at NATO level.

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FEASIBILITY ANALYSIS OF NAVAL BASE RELOCATION USING SWOT AND AHP METHOD TO SUPPORT MAIN DUTIES OPERATION

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Naval Base as part of Integrated Fleet Weapon System has an important role in maintaining the strategic environment in the region of Indonesia. Naval Base with a strategic location will support Indonesian Navy's main duty to carry out the administrative and logistical support. Due to the limitation of Naval Base's condition, feasibility study will be required to relocate the Naval Base. In this feasibility study, a combination of methods between SWOT analysis and Analytical Hierarchy Process (AHP) is used. The results of the Internal Factors Evaluation (IFE) Matrix Analysis is 4.72 and External Factors Evaluation (EFE) Matrix Analysis is 2.91. In general, the balance of power between the IFE Matrix and EFE Matrix is located in Quadrants I and thus, the Aggressive Strategy is supported. While the Matrix Analysis' result of Internal - External (IE) showed that the score of IFE and EFE located in Quadrant II and VII.

Key words: *Feasibility Study, Naval Base, SWOT, AHP*

1. INTRODUCTION

Indonesia is a maritime country comprising over 17.000 islands. It is located between the Pacific and Indian Oceans and links Asia land with the Pacific world (1). The geo-strategic of Indonesian is a potential tool to controls several critical path across the oceans in the world (2). Under the changing circumstances of operational environment and in the face of new security environment which is more complex and ambiguous than before, modern armies have started to look for alternatives or better options to surpass the challenge of transition in the new era (3). The prospect of declining budgets

and the changing geostrategic environment had also urged the Navy to change its strategy decision (4).

Therefore, to protect Indonesia's marine territory, Indonesian Navy holds a program to strengthen the defense with The Integrated Fleet Weapon System. That program consists of navy vessel, aircraft, troops (Marines) and Naval Base. As part of Integrated Fleet Weapon System, the Naval Base should be able to carry out its functions optimally to resolve cases of violations in Indonesia's marine territory (5). One of the Indonesian Navy strategic plans in the dynamics of change is to relocate the Naval Base into a better place because the current condition of the Naval Base is still lacking the ability to carry out its duties.

The feasibility study on the relocation of the Naval Base is carried out by doing an investigation the areas and supporting facilities in terms of technical and strategic aspects along with interviewing Indonesian Navy's officer. The technical aspects of a port include Hinterland/ Area of Influence aspect and Geography and Oceanography aspect (6). Geographically, military also considers of militarism perspective and spatial perspective (7). This is because globalization and economic power are worthless without the existence of military (8). A strategic position is an important element for the operation of a concept (9).

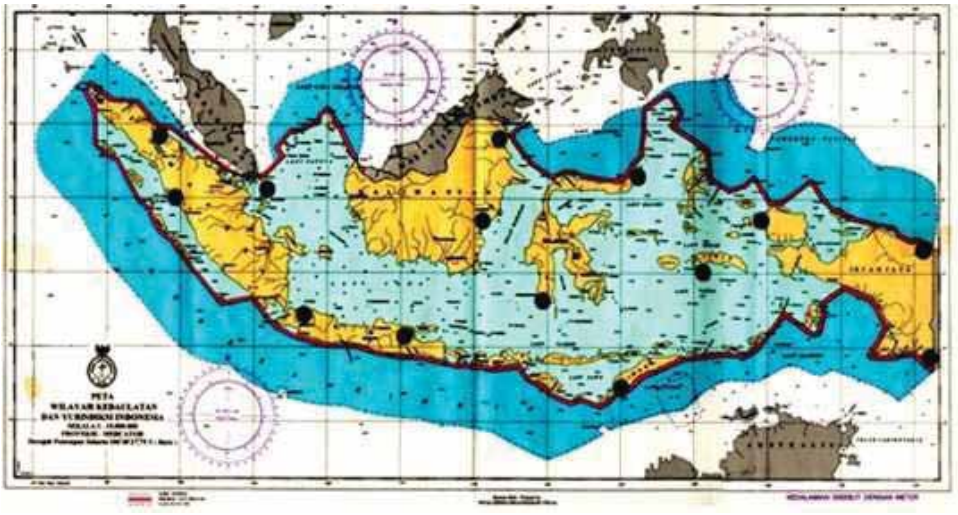

Fig. no. 1. *Map of the Indonesian Naval Main Base*

Strategic Decisions (SD) are made based on the special characteristics of the decision (both the perceived characteristics and typology objectives strategic decisions) which is part of the management leadership characteristics and has contextual factors refer to the external and internal environment (10). The purpose of this feasibility study is to provide a more realistic perspective from key decision makers in decision making process (11). This study is necessary to determine the effectiveness and to manage the risks of some system that will be used (12).

Therefore, this feasibility study to relocate the Naval Base is part of a research operation based on multi-criteria decision making (MCDM). The core of the operations research is to develop approaches for optimal decision making. A prominent class of such problems is multi-criteria decision making (MCDM). The typical MCDM problem deals with the evaluation of alternatives in a set of decision criteria (13). One way MCDM approach is to use a SWOT and AHP analysis. The combined use of the AHP and SWOT analysis has been widely used to support strategic decision- making processes (14).

SWOT analysis is an important part of feasibility study (15). A SWOT analysis is able to identify conditions, potentials, and problems with related aspects which resulted in the decision of a number of factors or variables (16). This combination can efficiently evaluate SWOT sub-criteria and thus give them priority in order to allow decision-makers to determine which of those should be given attention first (17). To obtain the scale ratio from the actual measurement or the fundamental scale that reflects the relative strength, AHP method is used (18). There are some basic principles in resolving the problems with the AHP method, namely Decomposition, Comparative Judgment, Synthesis of Priority, and Logical Consistency (19).

By combining SWOT and AHP analysis stages, the right strategies can be determined for planning the relocation of the Naval Base. Furthermore, this strategic planning can be used as a tool of organization to start and manage their strategic functions of the organization (20). This study is necessary in order for the Naval Base to function optimally and effectively. This study determines the strategic priorities of location and relocation of the Naval Base. It also provides a feasibility study for the development of Naval Base as a guideline in planning other Naval Bases and facilities in future.

Section 2 of this paper laid out the research methodology. The results are discussed in Section 3. Section 4 provides general discussion of the results, while conclusion of the study can be found in Section 5.

2. RESEARCH METHODOLOGY

SWOT and AHP integration is used for the flowchart in this research (21). SWOT provides the basic frame to perform an analysis of the decision situation, and the AHP assists in carrying out SWOT more analytical and elaborating the analysis so that alternative strategic decisions can be prioritized (22). The aim of applying the combined method is to improve the quantitative side of strategic planning (21).

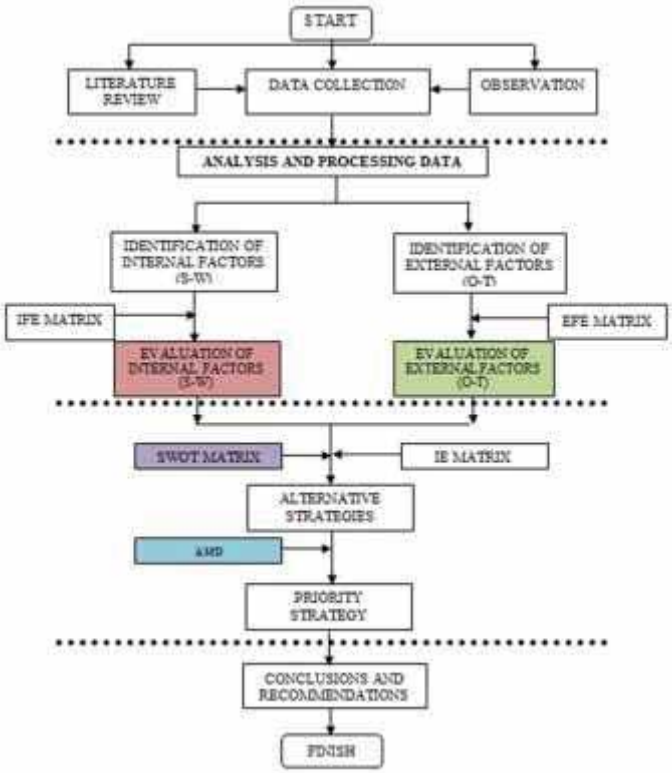

Fig. no. 2. *Research Integration SWOT and AHP Flowchart*

2.1. Naval Base Environment

Naval Base is expected to be the spearhead force in carrying out the task of supporting the warships operation (23). The main duty of the Naval Base is to carry out administrative and logistical support in order to develop the concept of logistics operations support (24). The requirements of Indonesian Naval Base include Port Facility, Maintenance and Repair Facility, Supplies or Logistics Facility, Personnel Care Facility, and Training Base Facility.

Table 1. *Indonesian Naval Base Standard Facility*

No.	Standard Bases of Indonesian Navy	Basic Building Coefficient
Port Facility	Capable in leaning all kinds of warships, at least one task force	20%
Maintenance and Repair Facility	Able to carry out maintenance and repairs up to the intermediate level for all types of warships both system, weapons and platform	10%
Supplies or Logistics Facilitiy	Able to support Class Logistics (food, individual field equipment, tools, oils, drugs) for at least one task	10%
Personnel Care Facility	Support personnel includes: messing, medical facilities/hospital, sports and recreation facilities, religious facilities, and training facilities to at least one task force.	30%
Training Base Facility	(1) The Common Facilities, capable of providing office facilities and infrastructure activities on the base. (2) Freight Services Facilities, able to support the transport and postal personnel by land, sea and air. (3) Defense Base Facilities, capable of providing defense and security against threats from the air, sea and land as well as infiltration / sabotage.	30%

The others general environment which includes the socioeconomic, educational, legal– political, and cultural aspects, usually operates within a specific geographic area. The specific environment is comprised of the suppliers, distributors, government agencies, and competitors which a military organization should interact (25), including the effect of the population, political institutions, geo-culture, and others in determining the exact location (26)

2.2. SWOT Analysis

SWOT is a method used to analyze operational environment with a systematic approach. This analysis is also utilized for strategic planning (27). SWOT analysis is based on the logic of maximizing the Strength and Opportunities as well as minimizing the Weaknesses and Threats simultaneously (28). SWOT analysis is obtained from the identification of the conditions, potentials

and problems with aspects related to use SO (Strength Opportunity)/ Maxi-Maxi Strategy, WO (Weakness Opportunity)/Mini-Maxi Strategy, ST (Strength Threat)/Maxi-Mini Strategy, WT (Weakness Threat)/Mini-Mini Strategy(29).

Table 2. *SWOT Matrix*

SWOT Matrix	**Strength (S)** Positive internal aspects that can be controlled and can be strengthened in the planning.	**Weakness (W)** The strategy of internal negative aspects that can be controlled and can be corrected in the planning.
Opportunity (O) Positive external conditions that can't be controlled and can be taken advantage.	**SO Strategy** Utilizing Internal strength to take advantage of external opportunities.	**WO Strategy** Improving internal weaknesses by taking the clappers of external opportunities
Threat (T) Negative external conditions that can't be controlled and may be minimized impact.	**ST Strategy** Using force to avoid or reduce the impact of external threats	**WT Strategy** Defensive tactics directed at reducing internal weaknesses and avoid external threats

2.3. Stages of AHP

Additional value from SWOT analysis can be achieved by performing pair-wise comparisons between SWOT factors and analyzing them by means of eigenvalue technique as applied in AHP means of eigenvalue technique as applied in AHP (29). Relative importance weights of the SWOT factors and sub-factors were obtained by Analytic Hierarchy Process (AHP) model, as well as the ranking of identified strategies. It was performed by several experts (30). The stages of decision-making with AHP method are as follows:

a. Define problems and determine solutions.

b. Creating a hierarchical structure

c. Pairwise comparison matrix formed by choice or judgment of the decision maker to assess the level of importance of an element than any other element.

d. Normalize the data

e. Calculating eigen values vector and tested for consistency

f. Repeat steps 3, 4, and 5 for all levels of hierarchy.

g. Calculating eigen vector of each pairwise comparison matrix.

h. Test the consistency of the hierarchy in the form of relationship priorities as eigen vector against consistency.

If that assessment is perfect in any comparison, then $a_{ij} \cdot a_{jk} = a_{ik}$ for all, and A matrix is called consistent (21).

$$\begin{bmatrix} 1 & a_1 & \cdots & a_{1n} \\ \frac{1}{a_1} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{a_{1n}} & \frac{1}{a_{1n}} & \cdots & 1 \end{bmatrix}$$

The values of the comparison matrix A can be expressed into the following forms:

$$a_i = \frac{w_i}{w_j}; (i, j = 1,2,3,\cdots,n) \quad (1)$$

$$a_i \cdot \frac{w_j}{w_i} = 1; (i, j = 1,2,3,\cdots,n) \quad (2)$$

Consequences:

$$\sum_{j=1}^{\bar{n}} a_i \cdot w_j \cdot \left(\frac{1}{w_i}\right) = 1; \ (i = 1,2,3,\cdots,n) \quad (3)$$

$$\sum_{j=1}^{n} a_i \cdot w_j = n \cdot w_i; \ (i = 1,2,3,\cdots,n) \quad (4)$$

Equation (4) in the form of a matrix becomes.

$$A \cdot w = n \cdot w \quad (5)$$

If Z_1, Z_2, Z_3, ..., Z_n are numbers that is in accordance with equation $A \cdot w = n \cdot w$ (Z is eigen value of A matrix, and if $a_{ii} = 1$ to i) then an equation becomes

$$\sum_{i=1}^{n} Z_i = n \quad (6)$$

If A is a pairwise comparison matrix, to obtain the priority should be sought w vector satisfying the equation.

$$A = Z_m \cdot w \quad (7)$$

Indicators of consistency measured using Consistency Index (CI) were formulated

$$c = \frac{z_m - n}{n - 1} \quad (8)$$

And for measuring the $C = \frac{C}{R}$tency of assessment is used Consistency Ratio (CR)

(9)

A certain level of consistency is required in determining the priority to obtain valid results. CR value should not be more than 10% or 0.10. If not then need to be revised (21). Random Index (RI) value can be seen in the following table:

Table 3. *Random Index (RI)*

n	1	2	3	4	5	6	7	8	9	10	11	12	13
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	+1.49	1.51	1.54	1.56

3. NUMERICAL CALCULATION RESULT

SWOT data processing in primary data collection is done by interviewing officer of Indonesian Naval Base Facilities Services, Hydro-oceanographic Office and Naval expertise competence. The results of the interview data were processed by Expert Choice Software into criteria and weighting data in accordance with the numerical calculation.

3.1. Internal Criteria

Table 4. *Primary Data of Strengths and Weaknesses*

No	Internal Criteria	Total Count
	Strengths	
S.1	Policy	52
S.2	Main Duties Naval Base	48
S.3	General Requirements of Naval Base	47
S.4	Availability of Logistics Region	47
S.5	Topography	47
S.6	Classificationof Naval Base	47
S.7	Function of Naval Base	47
S.8	Personnel Readiness	47
	Weaknesses	
W.1	Areas of Operation	44
W.2	Supporting Facilities	43
W.3	Layout Design	43
W.4	Geology	42
W.5	Availability of Shipyard	40
W.6	Availability of Public Facilities	40

3.2. External Criteria

Table 5. *Primary Data of Opportunities and Threats*

No	External Criteria	Total Count
	Opportunities	
O.1	Regional Spatial	48
O.2	Availability of Land	47
O.3	Oceanography	47
O.4	Sedimentation	47
O.5	Geostrategic and Geo-economy	47
O.6	Unit Support	45
O.7	Availability of Public Pier	44
	Threats	
T.1	Community Support	38
T.2	Sailing Volume	38
T.3	Road Access	38
T.4	Supporting Facilities	36
T.5	Level of Insecurity	28

3.3. Weight Determination and Critical Value

Data processing in Critical Weight Determination and Value at AHP SWOT performed using Expert Choice Software. Furthermore, the data was presented in Excel format to determine the criteria for scale rating score.

Table 6. *Critical Value Weighting of SWOT Criteria*

SWOT GROUPS	Importance of the SWOT Criteria	SWOT sub-criteria	Local importance of SWOT sub-criteria	Weight Total (N)	Score (J)	Rating score (N) x (J)
Strengths (S)	0.337	1 Policy	0.239	0.081	52	4.19
		2 Main Duties Naval Base	0.157	0.053	48	2.54
		3 General Requirements Naval Base	0.147	0.050	47	2.33
		4 Availability of Logistics Region	0.123	0.041	47	1.95
		5 Topography	0.109	0.037	47	1.73
		6 Classification of Naval Base	0.087	0.029	47	1.38
		7 Function of Naval Base	0.081	0.027	47	1.28
		8 Personnel Readiness	0.058	0.020	47	0.92
		Total	1.00	0.337		
Weaknesses (W)	0.295	9 Areas of Operation	0.244	0.072	44	3.17
		10 Supporting Facilities	0.202	0.060	43	2.56
		11 Layout Design	0.182	0.054	43	2.31
		12 Geology	0.140	0.041	42	1.73
		13 Availability of Shipyard	0.122	0.036	40	1.44
		14 Availability of Public Facilities	0.111	0.033	40	1.31
		Total	1.00	0.295		
Opportunities (O)	0.223	15 Regional Spatial	0.228	0.051	48	2.44
		16 Availability of Land	0.214	0.048	47	2.24
		17 Oceanography	0.142	0.032	47	1.49
		18 Sedimentation	0.126	0.028	47	1.32
		19 Geostrategic and Geo-economy	0.123	0.027	47	1.29
		20 Unit Support	0.085	0.019	45	0.85
		21 Availability of Public Pier	0.083	0.019	44	0.81
		Total	1.00	0.223		
Threats (T)	0.146	22 Community Support	0.291	0.042	38	1.61
		23 Volume Sailing	0.246	0.036	38	1.36
		24 Road Access	0.206	0.030	38	1.14
		25 Supporting Facilities	0.152	0.022	36	0.80
		26 Level of Insecurity	0.104	0.015	28	0.43
		Total	1.00	0.146		

3.3.1. Internal Factors Evaluation (IFE) Matrix Analysis

Table 7. *IFE Analysis*

SWOT GROUPS Level 1	Internal SWOT sub-criteria	Local importance	Rating	Score (2)x(3)
	(1)	(2)	(3)	(4)
Strengths (S)	1 Policy	0.239	4.19	1.00
	2 Main Duties Naval Base	0.157	2.54	0.40
	3 General Requirements of Naval Base	0.147	2.33	0.34
	4 Availability of Logistics Region	0.123	1.95	0.24
	5 Topography	0.109	1.73	0.19
	6 Classification of Naval Base	0.087	1.38	0.12
	7 Function of Naval Base	0.081	1.28	0.10
	8 Personnel Readiness	0.058	0.92	0.05
	Total	1.00		2.45

SWOT GROUPS Level 1	Internal SWOT sub-criteria	Local importance	Rating	Score (2)x(3)
	(1)	(2)	(3)	(4)
Weaknesses (W)	9 Areas of Operation	0.244	3.17	0.77
	10 Supporting Facilities	0.202	2.56	0.52
	11 Layout Design	0.182	2.31	0.42
	12 Geology	0.140	1.73	0.24
	13 Availability of Shipyard	0.122	1.44	0.18
	14 Availability of Public Facilities	0.111	1.31	0.15
	Total	1.00		2.27

From the analysis above, the score of 4.72 was relatively obtained. This result was ranging in the scale of 4 and indicates that these factors are very strong in influencing internal factors of Naval Base relocations.

3.3.2. External Factors Evaluation (EFE) Matrix Analysis

Table 8. *EFE Analysis*

SWOT GROUPS Level 1	External SWOT sub-criteria	Local importance	Rating	Score (2)x(3)
	(1)	(2)	(3)	(4)
Opportunities (O)	1 Regional Spatial	0.228	2.44	0.56
	2 Availability of Land	0.214	2.24	0.48
	3 Oceanography	0.142	1.49	0.21
	4 Sedimentation	0.126	1.32	0.17
	5 Geostrategic and Geo-economy	0.123	1.29	0.16
	6 Unit Support	0.085	0.85	0.07
	7 Availability of Public Pier	0.083	0.81	0.07
	Total	1.00		1.71
Threats (T)	8 Community Support	0.291	1.61	0.47
	9 Sailing Volume	0.246	1.36	0.33
	10 Road Access	0.206	1.14	0.23
	11 Supporting Facilities	0.152	0.80	0.12
	12 Level of Insecurity	0.104	0.43	0.04
	Total	1.00		1.20

From the analysis above, the score of 2.91 was obtained. This result is ranging in the scale of 3, indicating that these factors had a higher response above than the average in influencing external factors of Naval Base relocation..

3.4. Sensitivity Analysis

A sensitivity AHP analysis on the weight of the priority criteria can determine the order of priority strategy. Dynamic graph sensitivity can also be characterized as the table below.

Fig. no. 3. *Dynamic Graph Sensitivity to Goal*

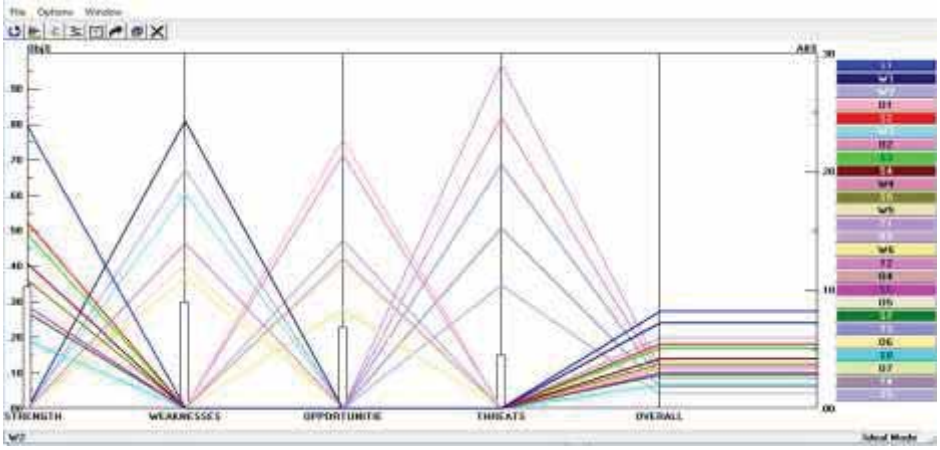

Fig. no. 4 *Performance Graph Sensitivity To Goal*

From the condition above, the priority Strength was 33.7% and in those conditions, the global priorities of Strength was 33.7%, then Weaknesses 29.5%, Opportunities 22.3% and Threats 14.6%.

4. DISCUSSION

The formulation of the Strategic Priorities from IFE and EFE matrix results, it is showed that the intersection of the four lines namely Strength, Weaknesses, Opportunities and Threats factor are as follows.

Scores Strengths - Weaknesses score = 2.45 to 2.27 = 0.17

Scores Opportunity - Threat Score = 1.71 to 1.20 = 0.51

In the chart above, the data were obtained through EFI and EFE matrix. The strength comparison stands in Quadrant I and it supports The Aggressive Strategy. It is depicted in the graph below:

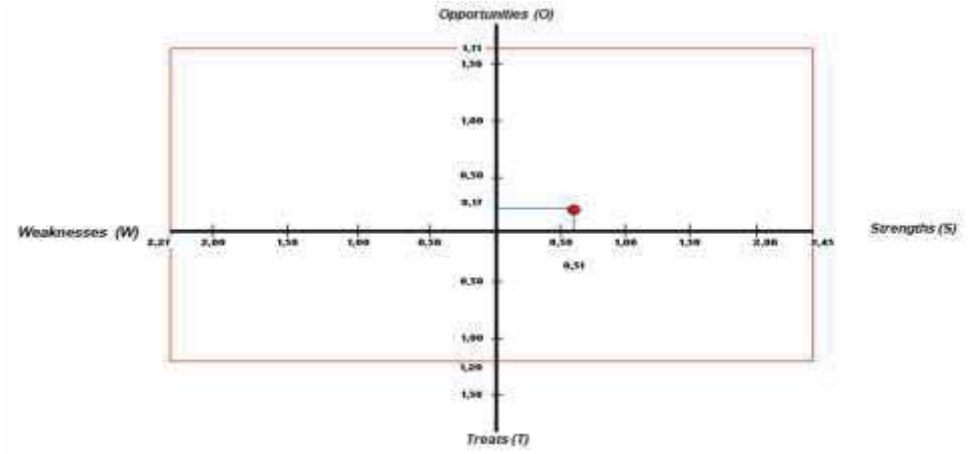

Fig. no. 5. *SWOT Analysis Graph*

4.1. SWOT Matrix Analysis Priority Based on AHP

Table 9. *SWOT Matrix Research*

INTERNAL FACTOR / EXTERNAL FACTOR	STRENGTHS (S) 1. Policy 2. Main Duties Naval Base 3. General Requirements Base 4. Availability of Logistics Region 5. Topography 6. Classification of Naval Bases 7. Function of Naval Base 8. Personnel Readiness	WEAKNESSES (W) 1. Areas of Operation 2. Supporting Facilities 3. Layout Design 4. Geology 5. Availability of Shipyard 6. Availability of Public Facilities
OPPORTUNITIES (O) 1. Regional Spatial 2. Availability of Land 3. Oceanography 4. Sedimentation 5. Geostrategic and Geo- economy 6. Unit Support 7. Availability of Public Pier	SO STRATEGY 1. Preparation of the administration of relocation 2. Design Plan of Naval Base **(S1)(S2)(S5)(O2)(O3)(O4)**	WO STRATEGY 1. Cooperation of area development 2. The establishment of economic centers **(W2)(W3)(O1)(O2)(O5)**
THREATS (T) 1. Community Support 2. Sailing Volume 3. Road Access 4. Supporting Facilities 5. Level Of Insecurity	ST STRATEGY 1. Empowerment of maritime potency 2. Development of the surrounding area **(S2)(S7)(O1)(O2)**	WT STRATEGY 1. Cooperation with local companies 2. Utilization of the existing contour 3. Implementation of routine operations. **(W2)(W3)(W6)(T1)(T2)**

4.2. Matrix Internal - External (I-E) Analysis

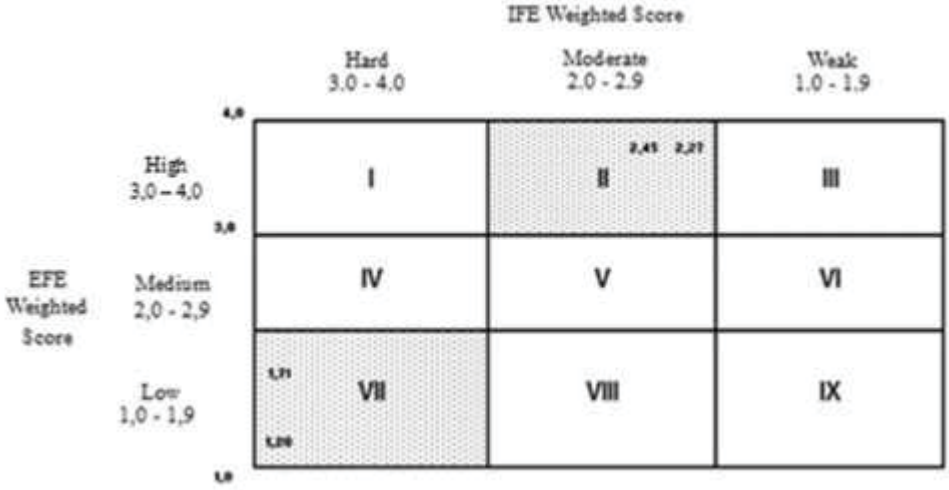

Fig. no. 6. *I-E Matrix*

4.3. Priority Strategies

S-O Strategy was selected as a priority strategy to relocate the Naval Base. This strategy can succeed by preparing the location details in advance. Furthermore, the implementation of the relocation of the Naval Base implemented according to plan with the support of local topography and oceanography state.

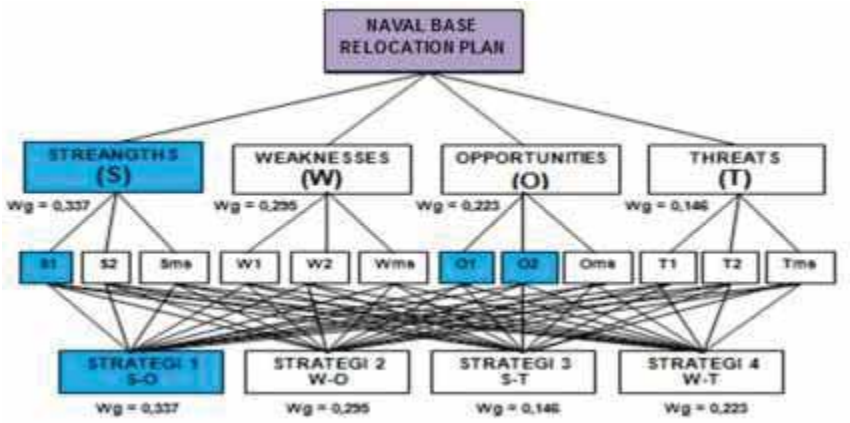

Fig. no. 7. *SWOT Hierarchy of the Priority Strategies*

5. CONCLUSION

In this paper, we have determined the strategic factors significant to relocate Naval Base by combining the SWOT method with AHP technique. Strength and Opportunities (S-O) strategy is a strategic priority to support the relocation of the Naval Base. So that the main duties of the Naval Base can be successful, especially for warships operation in the Indonesian territory. Chart analysis of IFE and EFE matrix shows that the strategy is in Quadrant I, which supports an aggressive strategy by leveraging existing strengths and opportunities. Expectations of future research on any MCDM techniques also can use CBA (Cost Benefit Analyze) method to determine the cost of relocating Naval Base.

Acknowledgement

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DIVERGENT OR CONVERGENT TRENDS IN PROFESSIONAL MILITARY EDUCATION IN SLOVENIA?

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There is a decade long discussion about the professional military education in Slovenia. The country has developed its own military force after the independence in 1991. Since the lack of the professional officers corps there was a decision adopted to have a convergent system of staffing the military with the officers. The future officers have to obtain high school or university degree at civilian education institutions, after that they get the military training and education provided by the Slovenian Armed Forces. However, there have been some insufficiencies in the system and therefore the ideas how to change the system of professional military education in Slovenia have been constantly raised. There are several questions on military education in Slovenia that are presented and discussed in the paper in the framework of divergence and convergence of the military and its parent society.

Key words: *professional military education, military education, officer school, divergence and convergence, Slovenian Armed Forces*

1. INTRODUCTION

At the beginning of the 1990s, when Slovenia, in the process of acquiring its independence, had been gradually building its own military, various kinds of personnel were included in the military (with different levels of education, expertize, military skills and knowledge, career background, etc.). They performed their roles well enough; however, the military was under constant reforms and transformation. The Slovenian Armed Forces (SAF) evolved toward a full defense institution, then transformed itself into a small professional military, into a "NATO military," into a military that actively participates in international missions and operations, and, recently, also into a military that takes a significant part in civil protection and rescue. In general, a desire to be a modern military has been constant. Demands to clarify the nature of the education system for the military personnel were also constantly raised. Unfortunately, there have been too many and too diverse ideas and suggestions how to do it but not enough will to do anything decisive. Consequently, the system of education of personnel remains an open question for the Slovenian military and a point of never ending discussions among the stakeholders in the defense ministry, Slovenian Armed Forces (SAF), several civilian education

institutions in Slovenia, and also some civil forums. Among the issues and dilemmas that emerge when the military education in Slovenia is discussed are the following: How many new officers per year does the SAF need? What kind of knowledge should they have? Shall a military academy be established or do existing study programs at the universities correspond to the needs of the military? Who shall provide the lectures? Shall the SAF's officers be educated in foreign countries? How shall the staff education be executed? Who shall pay for the education of military officers?

There have been several discussions made (Ministry of Defense 1995, for example), initiatives established and agreements adopted (agreement on cooperation of Ministry of Defense and four Slovenian Universities, signed in September 2011), student works finished (at least 16 bachelor's theses, nine master theses and one doctoral dissertation – Brožič, 2010)[1] and articles published (Jelušič et al., 2007; Svete et al., 2011; Vegič & Zabukovec, 2014; Vegič, 2017; Kladnik, 2017, etc.), and some provisions were put into formal documents; however, the system of professional military education (education of military officers) in Slovenia has not yet been settled.

In this article, some issues and dilemmas will be presented and discussed through the lenses of a divergent-convergent paradigm. Specifically, as a social institution and as the institution that should provide the external security of the society, the military is often compared with its parent society (see Caforio, 2007, for example). The research question of this study is derived from this approach. I will attempt to answer the question of whether the main reason that we do not have an officially adopted and settled educational system for military officers in Slovenia lies in the gap between the divergence and convergence of Slovenian Armed Forces and Slovenian society and its civilian educational system.

2. PARADIGM OF DIVERGENCE AND CONVERGENCE

According to Bruneau (2012), the concept of military effectiveness and the concept of democratic control shape the discussion on professional military education. Bruneau wanted to show that in the United States democratic control was not an issue (with the exception of the possible beliefs of a few academics) while military effectiveness was. In fact, effectiveness is very important for the military. Furthermore, the professional military education has to bring the military officers to the capabilities to reach the effectiveness of the military. In a similar manner, French (2014) speaks about "operational" versus "non-operational" military. "The

operational military fights and trains to fight wars. The non-operational military runs the government jobs program that is the stateside/ peacetime armed forces" (French: 2014, p. 215).

A desire of the military to remain in charge of the education of its personnel (in fact, if we understand the military officership as a profession, such a practice is normal – the professions themselves are in charge of the education and nominations of their members – see Garb, 1995) and some intervening factors complicate the modern professional military education. Specifically, there are requests for the military programs to be officially accredited (and there are many problems due to the non-academic content of curricula and non-academic references of military course holders), to involve a large amount of knowledge that is not purely military in the educational programs (such as contemporary demands of the environments in which the military work), and it also seems – as shown by the RAND Air Force project (Keller et al., 2013) – that the civilian teachers cost less than military teachers. However, while on the one hand there is a critique of military education (Johnson-Freese, 2011), there is a reluctance to accept the military in academics on the other (see Bateman, 2008). The mixture of civilian and military demands, when the modern professional military education is in question, lead us to think about it in the framework of the convergent and divergent paradigm.

When we talk about divergence and convergence, we talk about trends. In the case of divergence, the military and society are further and further away from each other, the military has its own distinct characteristics, processes, values, habits, structure, knowledge, relations, etc., which are different from social ones. In the case of convergence, the military and society get closer to each other, and they become similar in characteristics, processes, values, habits, structure, knowledge, relations, etc. The issue of divergence and convergence among the military and its parent society has characterized almost all modern military sociology, although these specific terms have not been mentioned. Specifically, military sociology is dedicated to the civil-military relations as well as to relations and structures in the military, which are compared to the social ones or for which the explanations are sought in the society (more in Garb, 2009). The terms divergent and convergent have been used since the end of the 1990s in European military sociology. Sarvaš and Hodny (1998) used the divergent-convergent model for the analysis of motivation for joining the military; Kiss (1999) used it to show the development of modern military organizations; Caforio (2000) used it to analyze trends in military education.

3. ISSUES AND DILEMMAS OF PROFESSIONAL MILITARY EDUCATION IN SLOVENIA

When the discussion on the military education of Slovenian officers began at the beginning of the 1990s, the basic idea was to consider specific national features, such as the need for a low number of military officers, different historical circumstances, etc. As concluded on the Conference on the Education of the Officers of the Slovenian Armed Forces, which was organized by Ministry of Defense and held on 28th September 1994, the education of future officers should be based on the civil public education system, but the so-called functional education (we could call it "military education and training") should be carried out by educational institutions in the SAF. In fact, since Slovenian independence in 1992, professional military education in Slovenia has consisted of a bachelor degree, from any civilian faculty, and the Officer Candidate School and later other functional military programs executed by the SAF. Such an arrangement indicates that Slovenia decided for the convergent model of education. Unfortunately, as Vegič (2017, p. 90) also observes, the university degree of the officer candidates is often neglected in the SAF. As part of professional military education, the basic civilian bachelor degree equips future officers with the knowledge of political science, law and international law, technical engineering, and of sociological, anthropological, leadership and management, economic, psychology, chemistry, physics, etc., which are all vital for military work. Vegič (2017, pp. 90-91) pointed out that the study program behind the degree is not among the criteria for the selection of officer candidates. The military should pay more attention to this and select the candidates with valuable education. At present, more officers with technical degrees would be welcome.

Due to some dissatisfactions with the existing system of professional military education, there are constant debates, proposals, ideas and different solutions present in Slovenia. For many years the debates have included the questions that follow.

3.1. How many new officers per year does the SAF need?

Currently the SAF amount to around 6,900 members. Since there is an inappropriate ratio of privates, NCOs, and officers at approximately 3:2:1 (some would say that almost every private has his/her own officer) and a lack of finances, there are even proposals to omit some generations at the officer candidate school. This is obviously not a proper approach as every military needs young officers. Bearing in mind that the average age of the SAF's personnel is 40 years and the average age of

officer corps over 40 years, it is urgent to have some newly educated and young officers. Unfortunately, some years ago, many officer candidates entered the military as privates, then they finished School for Non-Commissioned Officers, graduated from technical college or university, and afterwards they applied for Officer Candidate School. Such a career in the military should be only an exception (for few talented persons) and not a kind of normal entry into officer corps.

In the past (when the SAF had more members), there were evaluations that Slovenia would need around 50 new military officers per year (for standing army and reserve forces); today the needs are estimated to be 20 new officers per year (standing and reserve) at maximum. What form of education would be appropriate for a generation of 20 students/cadets?

3.2. What kind of knowledge should they have?

In the last 15 or even more years, two processes have advanced across the world: military schools applied for public accreditations (and they introduced publicly accepted programs in social sciences or other established disciplines), and military organizations recognized needs for knowledge and skills like foreign languages, knowledge of cultures, communication skills, ITC, etc. The traditional fight between advocates of "core military knowledge" and advocates of broad knowledge and skills of military officers is present also in Slovenia. Here a question can be raised what is a core military knowledge? In Slovenia, there is a strong desire in the military to include courses from the natural sciences and technology into the professional military education. People in the social sciences understand that and encourage these endeavors, but the faculties that held these courses/ programs are not very interested in participating in professional military education. The main reason probably derives from their reluctance to incorporate some military and defense studies courses in their curriculum (which would lead to the reduction of the core disciplinary content of the programs), and they argue that it would burden their students.

3.3. Shall a military academy be established or do existing study programs at the universities correspond to the needs of the military?

Some 10-15 years ago, the idea of establishing a military academy in Slovenia was raised. The fact that there had been some cadet schools on Slovenian territory in history was surprising, because most stakeholders were convinced that a convergent system of military education was settled in the early 1990s. Additionally, its curriculum cannot

be much different from that of an already existing program of defense studies at the Faculty of Social Sciences at Ljubljana University. Moreover, in that period, some military courses were established at other civilian faculties. The idea was also surprising due to trends in other countries (Poland, Czech Republic, and other), where military academies had gradually turned into political sciences schools.

3.4. Who shall provide the lectures?

I observed the question of content providers – military or civilian academics – in professional military education in Slovenia some years ago, when the idea of special programs for future military officers at some civilian faculties was discussed and later also executed to some extent. It was normal to expect that the military part of the program (core military content, such as courses on tactics and weaponry, as well as non-academic parts of the program such as military training) was executed by military experts. However, there are pressures for them to meet the same academic and scientific criteria as the civilian experts who taught in these and other university programs. It turned out that it was extremely difficult for military experts to attain scientific and academic titles and remains so. The reasons were not deeply explored. However, it seems to me that the explanation may have been in the gap between the bureaucratic nature of the military and academic nature of civilian university. In addition, it is very difficult for a military man/woman to fulfil the academic and scientific criteria through with military work and on military topics. As I read later, the similar gap between military and civilian teaching personnel is also present in professional military education in other states (see Johnson-Freese, 2012; Keller et al., 2013). However, if the military (more practical) content is given to the candidates in the process of internal education, a key question raised here is why they would have to meet civilian academic criteria. Real military expertise and experiences would be probably enough to equip the military candidates with the practical military knowledge. Other kinds of knowledge could be gained in the civilian education system.

3.5. Shall the SAF's officers be educated in foreign countries?

This was a supplemental option in all years. Non-commissioned officers and officers were sent abroad to get a degree (in military schools) or to attend special courses like language courses or courses in civil-military cooperation, etc. International cooperation can be taken as positive in general. However, some would say that attending military school abroad raise a young soldier in a different military culture that could

be problematic after the return in domestic armed forces, while others would say that the knowledge and degrees gained at military schools abroad are not sufficiently utilized by the SAF.

3.6. How to execute the staff education?

There are, of course, some advanced (staff) education programs for the career military officers. These programs in the SAF are not publicly accredited; they are valid solely for a professional career inside the military. There are some cases of attending postgraduate study programs at civilian universities simultaneously with the advance military programs; however, such a solution burdens the students heavily since they have to pass two complete programs (a military one and a university one). In the future, the staff education system also must be improved and settled.

3.7. Who shall pay for the education of military officers?

Professional military education is, of course, the responsibility of the state, as the military is the state's responsibility. Despite this fact, the question of a direct financier has emerged in the years of debates in professional military education in Slovenia. Put concretely: shall the education of military officers be covered by the defense budget or the budget of the ministry of education? The answer is partly connected to organizational solutions, but partly it depends on negotiations between the defense and educational sectors.

4. DISCUSSION AND CONCLUSIONS

The professional military education in Slovenia consists of two poles – a civilian one, that is part of the civilian educational system in the country, and the military one, that is executed in the military and by the military after the basic high school or university degree is obtained. Despite the relatively good concept of professional military education, there are also constant calls to settle it finally. The reasons are found mostly in the general dissatisfaction with the officer corps of the SAF. The present convergent system of professional military education is questioned in demands to give the future officers more military knowledge and more practical education, as well as to recruit younger officers. These expectations are clearly in favor of a more divergent military education, probably even a more divergent military. In fact, officer candidates must go through a lot of military training even now. I am mostly not familiar with its quality, but can only hope that they get proper military skills and knowledge during their core military education.

If we look at the open questions presented above, the conclusion about

the trends in professional military education in Slovenia (divergent or convergent) is not so clear. Regarding the number of military officers that have to be educated every year, it can be said that it is a divergent issue. We could hardly imagine that there would be educated military officers "in stock." The military educates the number of officers it needs or wants to employ. Compared to the civilian education institutions, which educate in advance, this is quite different. However, there are many discussions on the strategic military reserve in Slovenia that have not yet been fully developed. Specifically, some redundant (not employed by the military) educated military personnel would be serviceable for this military structure. If professional military education became more accessible, it would be a sign of convergence. However, there would always be the entering criteria that the candidates must fulfil, at least the health ones.

The contemporary challenges for the militaries create the needs that the military personnel be equipped with broad knowledge and skills, as well as the competencies to use it. It is obvious that military skills alone are not enough to fulfil the modern military missions and tasks. The convergence of knowledge and skills is a must. Especially for the small armed forces, it is necessary that their members are capable of diverse tasks. Despite that, we can understand the concerns of the advocates of the divergence in military knowledge and skills. The non-military knowledge and skills should be the addition to the military ones for the military officers and not a replacement.

The question of a military academy in Slovenia comes in waves: every few years, the initiative to establish it surfaces. It could be understood as a measure to improve the military professionalism in the SAF. Alternatively, it could be understood as an attempt to negate all the endeavors that have been made thus far in establishing a modern professional military education system in Slovenia. The establishment of a military academy would undoubtedly be a sign of military divergence.

The conclusion regarding lecture-givers in professional military education is evident. The military lecture-givers show the divergence, while the civilian lecture givers show the convergence. It is also evident that complete divergence is possible (also a case in the history of military education), while complete convergence is not. It would be unprofessional that the military training (which is part of professional military education) would be executed by civilians. Furthermore, the courses that contain military content require a military teaching person or a military retired teacher. All other courses could be taught by civilian experts or even at civilian education institutions.

The education of the SAF's officers abroad means more

divergence than convergence in professional military education. This conclusion is derived from the practice that the Slovenian officers or officer candidates are sent to the military programs abroad (military academies or defense universities). However, as already mentioned, the foreign military education institutions are in the processes of convergence, particularly in the knowledge they offer.

The relatively new half-integration of civilian post-graduate and military staff education is more a convergent than a divergent solution. Compared to the staff education years ago, it is an improvement; however, there are also some intentions to integrate the civilian and military part of staff education. It would be a step toward divergence despite the fact that civilian knowledge would be still part of the curriculum.

Furthermore, what can be said about the financing of the professional military education in Slovenia? Despite many saying that the education of the SAF's officers is divergent, because it is covered by the military budget, we must not forget about civilian degrees, which the majority of the military officers obtain at civilian public universities. Considering that the education of Slovenian military officers is mostly covered by the budget for public education, it is convergent. Some would additionally want the complete financing of the professional military education from the budget for public education. In such case, I would doubt that a simple transition of financing is possible; I would expect that the diminishing of the defense budget on the expense of educational budget would occur.

To conclude, the divergence of military and society in professional military education is not bad, nor is convergence. They are not completely good either. Not a stretch but a proper ratio of civilian and military education, knowledge and skills, values, role models, etc. would be necessary to attain a professional military education system in Slovenia. The established level of civil-military relations in a state influences the system of professional military education, other factors, such as missions, traditions, existing base of knowledge, also influence it. Looking at the issue from the point of view of a civilian university teacher in defense studies, I would express concern if the military would close itself or be closed inside its walls. However, the fear of the military of losing its military ethos is also legitimate and understandable.

ACKNOWLEDGMENT

The authors take full responsibility for the contents and scientific correctness of the paper.

ENDNOTES

[1] The data on students' theses on Slovenian military education at Slovenian universities and faculties

were obtained on May 16, 2017 through a search of COBISS+, the Slovenian librarian database.

[2] See some concerns and discussions in Micewski (2003), French (2014) and Toronto (2015).

[3] There are interesting data from the RAND study in United States Air Force Academy (Keller et al., 2013) on the impacts of civilian and military teaching staff.

[4] The situation is rather complicated. In the SAF not all advanced military programs are accompanied by the civilian education of candidates. The situation became complex after the reform of high education system in Slovenia (Bologna reform). Because the graduation in "pre-Bologna university programs" is equal to the master-of-arts degree in "Bologna programs", the candidates for staff military education with a "pre-Bologna" degree are not obliged to attend the civilian programs during staff education.

[5] Staff education should be a normal part of the career of each military officer. It was interesting and also unbelievable for me to read the article of Scales (2010) about the staff education in the American military. He realized that the "Army's full-term staff college is now attended by fewer and fewer officers. The best and the brightest are avoiding the war colleges in favor of service in Iraq and Afghanistan." (Scales, 2010).

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PERCEPTION OF ECONOMIC INDICATORS OF THE QUALITY OF LIFE BY PROFESSIONAL SOLDIERS SERVING IN THE ARMED FORCES OF THE SLOVAK REPUBLIC

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Quality of life is the general well-being of individuals and societies, outlining negative and positive features of life. It has a wide range of contexts, including the fields of international development, healthcare, politics and employment. Quality of life observes life satisfaction, including everything from physical health, family, education, wealth, religious beliefs, the environment, to employment and finance.

This article deals with the issue of quality of life of professional soldiers serving in the Armed Forces of the Slovak Republic. The quality of life of professional soldiers is greatly affected by the peculiarities of military service, specific features of military organizations and the society as well. This article author's attention is focused mainly on economic aspects of the issue. Presented findings and formulated conclusions are based on the available results of an empirical survey of the issue, which included a survey conducted by written interview using the questionnaire method. Based on the survey results the author identifies several key issues and makes recommendations, which could contribute to their solution in the future.

Key words: *quality of life, armed forces, income, consumption, savings, survey.*

1. INTRODUCTION

The life of professional soldiers serving in the Armed Forces of the Slovak Republic (hereinafter referred to as "AFSR") is mainly determined by physical, mental and moral demands that are placed on them. These demands include accomplishment of various tasks related to international crisis management operations as well as training and common routine duties at work. What is more, military organizations intentionally make each professional soldier heavily

dependent on them and, thus, they themselves take responsibility for maintenance and development of soldiers' living standard. The quality of life of this social and professional group of people is undoubtedly influenced also by the state labour market and employment policy as well as the budget, social, income, pricing, security, defence and economic policies. The society affects and regulates the quality of life of professional soldiers throughout their career by remunerating them and providing them with the complex social security system. From a moral point of view, it cannot get rid of this responsibility even after soldiers end their career, especially when they have been dependent on the society for a long time. It is, however, necessary to point out that the above mentioned factors do not determine only the quality of soldiers' life but also the quality of life of their families. According to experts [1], there is a close link between work and family life, which is related to social and economic status of professional soldiers and their families.

Based on currently available information [2], [3], [4], [5] we can say that the empirical study into the quality of life of professional soldiers serving in the AFSR has been so far focused on sociology. The greatest attention has been given to the aforementioned link between work and family life. None of the studies, which have been conducted so far, aimed to focus more on economic indicators of the quality of life of professional soldiers. Therefore, the staff of the Department of Management at the Armed Forces Academy of Milan Rastislav Štefánik in Liptovský Mikuláš conducted a survey the aim of which was to present how professional soldiers currently serving in the AFSR perceive the quality of life. The survey was conducted in 2016. It was focused on economic aspects and we would like to present its characteristics, results and conclusions in the following chapters of this article.

2. BASIC CHARACTERISTICS OF THE SURVEY

Our survey aimed to find out the respondents' opinions on the selected economic indicators of the quality of their life, and in broader sense, the quality of their houslehold [6]. These indicators were related to the four economic issues: an income or the financial situation in the household, savings, consumption and living in connection to mobility. The survey was focused on finding out how professional soldiers currently serving in the AFSR perceive the quality of their life especially in connection to financial security.

The subjects of the survey were 130 randomly selected professional soldiers, who serve in different bases, garrisons and installations within the AFSR and the Ministry of Defence of the Slovak Republic. The responses to the introductory identification questions showed that 6.2% of the respondents were NCOs and 93.8% of them were officers. Considering the size and structure of the sample group – the respondents were only officers or NCOs (there were no enlisted personnel included) and their numbers were disproportionate – it is necessary to emphasize that our surey findings cannot be regarded as conclusions which could be generally applicable to the entire armed forces personnel or to all the military ranks and could reflect an unbiased and real depiction of the quality of their life. However, these findings can explain how officers currently perceive the quality of their life. The respondents have been in the military from 1 to 30 years and the average length of their service was 17 years. Approximately three quarters (75.4%) of them were married, 15.4% were single and 9.2% of the respondents were divorced. Most of the respondents had three-member (35.6%) and four-member families (33.8%). Only 9.7% had families consisting of five and more members and at least 8% of them lived in a one-member family.

Our primary statistic source was a questionnaire that comprised 24 questions, including four identification questions placed after the introductory part. The questionnaire was anonymous and it contained several kinds of questions – in terms of the purpose: tool (identification and analytic) and result; with regard to kinds of responses: open and closed questions; in terms of contents: direct questions (simple questions, special rating scale questions) and indirect questions (based on selection and matching).

The obtained data were statistically processed and evaluated by means of descriptive statistics tools in Excel. Concerning our possibilities, we used especially the measures of central tendency and absolute variability. The results were interpreted in numbers and words.

3. INTERPRETATION OF THE SURVEY RESULTS

When assessing their financial situation, the respondents could choose from eight options and mark several items that suited them. More than half of the respondents (55%) chose the item: ”*I am quite satisfied with my financial situation*”. The second most frequent option was the statement: “*I would like to improve my financial situation in the future*”,

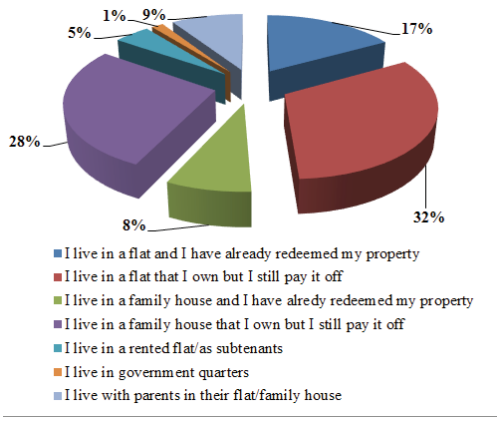
which was selected by 43% of the respondents. On the other hand, only 3% of them opted for the item: "*I am completely dissatisfied with my financial situation*". What is more, the results showed that almost half of the respondents (47.7%) think that their gross income per month is average and approximately 42% of them find it above the average. It is, however, necessary to point out that the respondents' opinions on their financial situation greatly varied according to their military rank. When the respondents were to state whether they try to improve their financial situation and how they do it, they could choose from nine options and mark several items that suited them. We found that almost half of the respondents (46.2%) do not try to improve their financial situation at all (they use only their salary to cover the expenses), which corresponds with the above mentioned results concerning the respondents' satisfaction with their money situation. On the other hand, approximately 35% of the respondents try to improve the financial and economic status of their household by different ways of saving money and about 14% of them by means of long-term credits.

Another set of questions focused on savings. As many as 87.7% of the respondents save money due to different reasons. The two major reasons were securing their children's future (savings for descendants) and the future insecurity (preventive savings, "*saving money for a rainy day*"). The least selected item was "*saving money to achieve life goals*". More than half of the households that save money (57.9%) are able to save less than one fifth of their income per month, 22.8% save approximately one fourth, 12,3% can save about one third and 5.3% are able to save more than half of their income. These findings need to be further compared to the data regarding especially the monthly income and structure and the number of members in individual households.

The income, structure and the number of the respondents' households determine also their consumption, e. i. their expenses. The survey results showed that the respondents spend most of their monthly income on household and living expenses. The second most important item of the monthly expenses was food. We also wanted to know how prices of food and consumer goods affect the respondents' spending. Only about 12% of the respondents stated that prices of food and consumer goods are not decisive when they do the shopping. Approximately 37% of them prefer purchase of food and consumer goods at discount prices. The respondents most often (65%) opted for the statement: "*I usually*

buy food and consumer goods in shopping malls and supermarket chains". Concerning purchase of durable goods, more than a half of the respondents (50.7%) prefer online shopping and 40% of them buy these goods at discount prices.

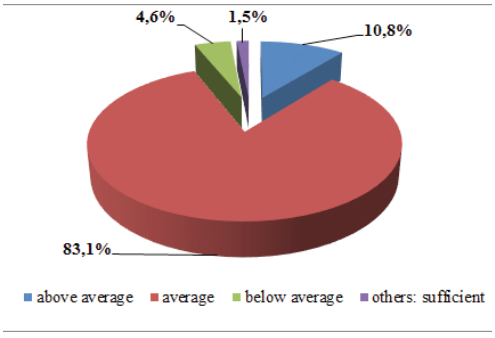
We found that more than three quarters of the respondents (84.6%) have rights of home ownership – 49.2% over a flat and 35.4% over a family house. Other results showed that 71% of the respondents, who own a flat or a house, have already redeemed their property, the remaining 29% are still paying it off. The respondents who do not own a real property (15.4%) live in the following ways: 9.3% of them live together with their parents in their house or flat, 4.6% of the respondents live a rented flat or as subtenants and 1.5% live in government quarters. See Graph 1.



Graph 1. Housing solutions

In another question, our respondents were to say whether professional soldiers regard the stabilisation allowances (previously known as "housing allowances"), which they receive in compensation for living expenses, as sufficient. More than a half of them (64.6%) think these allowances are not adequate. In the future, this finding needs to be regarded in terms of average living expenses in the regions where the respondents live. We also found than almost half of the respondents (46.2%) claim reimbursement for travel expenses connected with visits of their families [7]. The question related to commuting included more options the respondents could select. The most common statements were: "*I am willing to commute every day*" (44.6% of the respondents), "*I and my family are sensitive about long-term separation*" (32.3% respondents), "*I feel bad about having to change the place, the county or the region where I live*" (29.2% of the respondents). On the other hand, only 4.6% of the respondents chose the statement "*I have a difficulty commuting on a daily basis*". We also found that the respondents have had to change their residence 1.6 times on average during their career due to their postings. The interval for this question was 0 to 7. Most of the respondents (32) selected the item "*one time*".

In another question, the respondents evaluated the quality of their life in terms of their economic (especially financial) security. More than three quarters of the respondents (83.1%) consider it to be average. This finding needs to be further analysed with regard to the respondents' rank and appointment and, in broad terms, the statistic data concerning mainly average income and financial situation of households in Slovakia. See Graph 2 for more details.



Graph 2. Quality of life evaluation in terms of economic security of respondents

In the final part of the questionnaire, we provided space for the respondents' own opinions. Only about 14% of them used this opportunity. Their opinions were as follows: "*When the soldier's family moves due to his/her new posting, the AFSR do not help his/her spouse to e. g. find a new job*"; "*I find changes in the soldier's posting as one of the reasons for divorce and leaving the military*"; "*I do not see any progress regarding social security of professional soldiers (salary)*"; "*I think it is necessary to make the military job and service more attractive*"; "*I believe that the long-term stagnation in a position that does not suit my abilities and knowledge is the consequence of bad personnel policies of the AFSR*".

4. CONCLUSIONS AND RECOMMENDATIONS

We can draw the following conclusions from the partial results of our survey. Approximately half of the respondents are rather satisfied with their financial situation, which somewhat corresponds with another findings according to which almost half of the respondents (40%) are currently not trying to improve their financial situation and almost 40% of them would like to change it in the future. Moreover, approximately half of the respondents find the gross monthly income of their family average considering the situation in Slovakia and about 40% of them regard it as above average. We further found that the respondents spend most of their disposable monthly income on household and living expenses. The second largest expense is food. Most of the respondents (65%) prefer purchasing food and consumer items in shopping malls and supermarket chains. More than half of the respondents buy durable goods over the Internet. Almost 40% of the respondents prefer purchase of these items at discount prices. Approximately 90% of the respondents save the income

they do not spend owing to two main motives: the need to financially secure their children in the future and the need to build the ”nest egg” for the future. Most of the families that save money (about 65%) are able to save less than one fifth of their disposable income per month, which proves that most of the respondents and their families tend to spend more than they save. The monthly income, structure and the number of family members determine their savings but also the structure and amount of their consumption. This finding calls for further and broader analysis of these economic categories. Furthermore, we found that more than 80% of the respondents have rights of home ownership over a family house or a flat and approximately 70% of them have already redeemed their property. The quality of life of professional soldiers is improved also by the housing allowances they receive. We, however, found that more than 60% of the respondents find these allowances inadequate in terms of housing and living expenses. The results of our survey also showed that less than half of the respondents claim reimbursement for travel expenses connected with visits of their families and approximately the same number claim that they do not mind commuting to work on a daily basis. About 30% of the respondents are sensitive about long-term separation from their families and approximately the same number feel negative about having to change the place, the county or the region where they live. We also found that more than three quarters of the respondents consider the quality of their life to be average with regard to their economic (especially financial) security.

Based on the results of our survey, we arrived at the conclusion that some changes in the current law [8], [9] concerning general welfare of military personnel might make the professional soldiers serving in the AFSR more satisfied with their financial security and make the military service and profession more attractive for those who will want to join the AFSR in the future. The results of our survey could be used in the preparation and drafting of amendments to particular acts as well as in the open discussion regarding welfare and salaries of professional soldiers.

The results and conclusions point to the necessity of systematic, long-term and more detailed study into economic aspects of the quality of life of the AFSR military personnel as well as the necessity of searching for more effective solutions to the identified problems, especially in terms of recruitment and sustainment of personnel, social issues, family, job satisfaction, professional and personal expectations of the military personnel serving in the AFSR, etc. We believe that further studies into these issues should be also based on long-term efforts to create an unbiased depiction of the quality of professional soldiers’ life based on

assessment of the relevant economic indicators – the indicators of the quality of life. Therefore, it will be necessary to consider other important factors when conducting studies into these issues, such as the rank and appointment of respondents (first and foremost, the study group should comprise all the military ranks), the size and structure of respondents' families, economic activity of other members of the family, etc. Furthermore, it will be necessary to compare the survey results with the statistic data on economic aspects of the quality of life of the Slovak citizens, especially the data on the amount and structure of their earnings, expenses, savings, investments and so on, e. i the financial situation of households in Slovakia.

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[6] The Statistical Office of the Slovak Republic defines a private household as a person living alone or a group of people who live together in the same private dwelling and participate in expenses, including the common provision of living needs.

[7] Since these are travel reimbursements, they cannot be deemed to be a kind of compensation for the soldier's separation from his/her family, as it used to be in the past when soldiers received separation allowances and travel reimbursements pursuant to Act No. 380/1997 on Financial Perquisites of Soldiers.

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BUILDING UP STATE STRATEGIC RESISTANCE AGAINST HYBRID THREATS

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Hybrid warfare, conducted in Ukraine since 2014, has become a new geopolitical phenomenon which threatens the Euro-Atlantic security that appeared after the collapse of the bipolar world. The paper discusses how the Russian Federation takes advantage of hybrid warfare to achieve its political objectives and to further its own interests. The paper also contains an assessment of the threat of hybrid warfare in Poland and determines what undertakings are necessary to effectively counter threats coming from Russia.

Key words: *hybrid war, hybrid threats, contemporary military conflicts, resilience*

1. INTRODUCTION

Russia twice surprised the West within the last two years. The first time Russia negated the West's wrongful conviction of Russia's Armed Forces' low effectiveness. As it turned out the international community was not able to reply in a coordinated maner to hybrid actions which led quickly to Russia's strategic advantage not only towards Ukraine but also the entire Western world. Hence, Ukraine as a state became incapable to lead its existence as an independent state. What is more, after two years we can still notice the helplessness of international organizations and separate states towards hybrid war. It turned out to be the second surprise when Russia used its armed forces in Syria for the first time from the end of the Cold War and outside the borders of the former Soviet Union. It is not yielding to the doubt that the European Union which has been adhering to the principle soft power solved neither the problems of Ukraine, nor its own problems with the immigration wave. In this situation the thesis right which states that Russia is the main beneficiary of the international policy seems to be. In experts' opinion Russia's success in foreign policy is owed to the military instrument. That has broken successfully the USA monopoly on

using armed forces in interventions with expeditionary character.

According to P. Goble the pace of preparing Russia for the global confrontation with West increased (Goble:2016). At the present we can observe that fundamental changes of the course in the Russian politics took place. Just the opposite, the fact supporting the above mentioned is the attempt to draw Belarus into the confrontation with the Western states. Analysts of the Belarusian Centre for Strategic and Foreign Policy Studies claim that Belarus while keeping the neutral position in the face of the crisis in Ukraine and the full control over its own territory performs a significant contribution into the stability of the region. However, recently one can see unprecedented military and political pressures to Belarus on the part of Russia which can allow Russia to create the gray zone (Banasik:2016 a) from which the Russian Federation (RF) will steer conflicts in the region and run the confrontation with the West (Białoruski:2016).

More and more in Moscow there are opinions emerging about the real war led up with the West and this is not just the propaganda of political leaders or media. These ideas have the dimension of real moves directed to the dominance of the armed forces of the Russian Federation and in consequence to achieving victory in the future hypothetical confrontation (Krutikov:[2016]). The success relatively easy reached in Georgia in 2008 and in Ukraine in 2014, as well as the effective projection of armed forces in Syria and grade-separated adaptation to the local conditions of military strategy made some top Russian commanders feel a probable victory against NATO in the future.

2. RUSSIAN PERCEPTION OF HYBRID WAR

In the geopolitical context hybrid war is a new concept. Russian strategists understand hybrid war as the concept applied mainly in the sphere of special operations connected with the actions of opposition forces, as well as exploiting experience of the fight against the national radicalism and non – state actors jeopardizing international security (Bartosh:2015, p.73). On the account of the nondirective influence on all possible spheres of state functioning and in all dimensions with military and non-military instruments of the influence, hybrid war is an excellent mechanism leading to the destabilization of the neighbor states of the Russian Federation. In the dynamic way it joins hard and soft power which includes entire societies (Palmer:2015, p.8) taking into consideration cultural and physical aspects. Hybrid war joins the final state of actions, capabilities, takes into account the risk, guarantees the achieving of the planned political aims. This perceived conceptualization of hybrid war can justify the argument

that it is a strategy in the hands of politicians and according to F. Hoffman's opinion allows for preventing the disadvantageous conduct of the potential opponent as well as the forming of its own conduct (Manea:2016).

V. A. Kiselev and I. N. Vorobiev point out the geopolitical dimension of hybrid war. They introduce the notion of hybrid war as the form of conducting the warfare (military actions). According to them the hybrid operations are conducted in order to tear the part of the territory of the state and incorporate it with another state. It is made with the help of comprehensive political and diplomatic, information and propaganda, financial and economic undertakings, and also those of military character. In addition, a military campaign in its meaning is not conducted stricto senso. The actions on the opponent territory can be backed up with special operations and armed structures which are organized and prepared earlier for acting on the territory being a subject to a detachment and their task is to neutralize the armed forces of the opponent (Kiselev:2015, p.1).

Making oneself aware of the essence of hybrid war it is important to understand what way the Russians perceive war in general. The Russian comprehension of war is settling *on the social and political phenomenon of radical changes to the relations between states and nations and moving the opponent from using non-military and forceless forms and methods of rivalry to the direct application of measures of the armed struggle for the achievement of the determined political and economic targets* (Rogozin). Other measures mentioned in the definition hint at hybrid as directed to the strong and weak points of the opponent. The war is hybrid by linking aspects of insurrectionary action treated as the element of the irregular war with the actions of the conventional armed forces. Threats are growing constantly. However, the level of aggression is always below the threshold of the open armed conflict. Such a situation causes growing pressure in the international relations. The dominance of hybrid actions causes the local escalation of conflict and reveals the next sensitivities. The threat of using regular armed forces creates also a strategic advantage of the Russian Federation in such places as Crimea or Syria and that causes the fear that in a direct confrontation there is a lack of a robust reply not only from the side of the opponent but also from the side of international organizations.

3.THE POLISH PERCEPTION OF HYBRID WAR

The National Security Bureau (NSB; Biuro Bezpieczeństwa Narodowego – BBN) undertook the definition of hybrid war. In the proposal of new definitions from the field of the security, hybrid war is understood as *the war combining different possible means and*

methods of violence simultaneously, including especially regular and irregular armed operations, operations in the cyberspace and economic, psychological actions and information campaigns (propaganda) etc. (Słownik). The notion of subliminal aggression supplements the above mentioned definition and allows for a better understanding of hybrid war. According to Professor S. Koziej, in its confrontation with NATO the Russian Federation can use the method of aggression below the threshold of open regular warfare, i.e. the so-called subliminal aggression as one of the element of hybrid war (Pach:2016). The subliminal aggression is understood *as the warfare where the swing and the scale are limited on purpose and kept by the aggressor on the level of the threshold below letting identify regular open war.*

*The aim of the subliminal aggression is achieving the proposed objectives and simultaneous causing troubles for international security organizations in agreeing upon the decision-making course of action (*Słownik). Hybrid war is understood by M. Fryc a bit differently in comparison with NSB. The author's of this article point of view is that hybrid war is directed at reaching strategic objectives. *A whole range of diverse both material and immaterial, military and non-military, legal and illegal, direct and indirect measures are used for it. In its essence it takes the total dimension. Next approximately it selects and links to the action so that they bring the intentional effects. All possible measures are used (political, diplomatic, military, information, economic and cultural) which concur together for the direct threat and indirect pressure with the limited actions using the armed forces* (Fryc:2015, p.65). Worth underlining is that in hybrid warfare the space of the influence is crucial. Unlike the traditional war, it does not limit itself to the physical dimension and it is current in other dimensions in which so far regular armed forces did not have influence. In hybrid war, the triggering of the planned and desired effects is synchronized, which according to M. Fryc is significant.

In this respect, A. Deep applies an innovative approach and claims that effects are achieved thanks to applying asymmetric techniques and tactics, which are next synchronized on the multidimensional battlefield (Deep:2915, p.1). F. Hofman indicates the synergetic effect in physical and psychological dimension of the conflict. He also claims that the above mentioned effect can be achieved through multidimensional activities carried out by separate entities (even just one subject), but in general they are directed operationally and tactically in the main space of the hybrid war (Hoffman:2007, p.8).

Taking into consideration all quoted arguments we should think that **hybrid war is a strategic**

category. We should understand hybrid war as the war directed at achieving political objectives thanks to triggering synchronized kinetic and behavioral effects, by multidimensional applying of the instruments of the influence and capabilities which are in the disposal of the attacking party.

4. THREATS OF HYBRID WAR IN POLAND

In the opinion of Polish political and military decision-makers or experts, open NATO border crossing by the Russian Federation and the aggression on a large scale are rather improbable. Triggering the war with NATO is an inconceivable decision but it is not possible to rule it out. The full-scale warfare and peculiarly with using the weapon of mass destruction would be, however, a suicide. The Russian strategic doctrine assumes after all attacking the enemy on the whole depth of its territory, in all possible dimensions of the influence. Consequences of such action would be dangerous for the Polish allies. It is estimated that not only due to the treaty obligations, but also in their immediate strategic interests, the allied states would be interested in stopping aggression as far as it possible from their territories. The rational strategic calculation would suggest them to dispatch troops to stop the aggressor in Poland, overthrow it up as soon as possible so that do not conduct any fights on their territories and avoid losses in a follow-up war (Pach:2016). In the Polish reality the threat of hybrid war is more probable combined with limited kinetic action.

The so-called grey situations are considered to be the biggest threat in Poland and in NATO as well. The Russian Federation on purpose keeps the level of aggression below the red line which determines the border of a conflict. Russia consciously avoids violating Article 5 because it is in Russia's interest to avoid direct confrontation with the opponent which has a global majority of conventional power. In circumstances of non-supporting political climate, a competent selection and application of instruments and methods of influence by the potential aggressor can lead the international community to ambiguous statements. It is estimated that in such situations we would react in a longer time and in some cases perhaps all the time, independently. This can be caused by an aggression limited temporarily, by space and by involved forces. Moreover, it can be applied hidden, irregular, sabotage, and asymmetrical activities combined with selective surgical strikes of „unknown authorship", terrorist attacks in combination with the application of non-military means of violence to which it is possible to enumerate information war, cyber-attacks, energy blackmailing etc., as well as possible local collaborators (Pach:2016). Considerable risks connected with hybrid war can constitute unidentified individuals

who appeared in Ukraine and were called *little green men*. This is the notion which is popularly applied *to identify soldiers without military insignias or other signs, which would let the identification of their nationality, who run the armed regular and irregular operations on the territory of the Eastern Ukraine measured up against its integrity and independence* (Słownik).

In Poland it is considered that it is not possible to ensure the matter of the state security exclusively by enlarging the military strength. It is necessary to look at it from the perspective of the functionality of the entire national mechanism, in particular these processes which protect us against the effects associated with the internal threat. These hybrid threats can take the format of offensive actions in cyberspace, multi-dimensional diplomatic actions and the threat of performing terrorist attacks and disinformation operations. Equally important threats are attempts of destabilizing the political and economic situation through the compilation of action aimed at strategic objectives of the state, political sabotage and activities of hostile centers of propaganda (Ścios:2015).

The activity of the Russian secret services clearly intensified in Poland. Espionage is one of very effective forms in the frames of hybrid war. According to S. Koziej, hybrid war lasts already nowadays in the essence of considerable political and strategic pressure. *We are all the time under this pressure, this information war, for instance, this frightening, blackmailing by flights, transferring rockets, this all takes place* (I kto tu:2015).

A spectacular example of hybrid war was conducting the attack using anti-Polish propaganda against the state's interests. The minister of national defense and his spouse were attacked with counterfeit and completely irrational indictments which generated an increased public interest and build an atmosphere of suspicion. The further step consisted on including into the political action the agents of influence and using the publication as a pretext for formulating the application of dismissing the Minister of National Defense. The correlation of specific stages of influence shows that we dealt with synchronized and completely deliberate action the culmination of which had to take place in the eve of the Warsaw NATO Summit. The objective of this operation was undermining trust to the minister and management of the MoD, redirecting the public attention, triggering chaos and information confusion, weakening the negotiation position of Poland during the summit and creating negative image of the Polish authorities in the eyes of the NATO partners (Ścios:2015).

The Report of the Computer Security Incident Response Team presenting the data for 2014 does not leave any doubts that Poland became the target of one the elements of

hybrid war - which is information warfare. It is evident the distinct growth in dynamics of persistent, long-term attacks based on advanced tools. It means that apart from quantitative progress, the significant qualitative progress is also observed in led attacks. Simplifying the above stated, it is not enough that there are more attacks but they are currently much more dangerous. The crucial factor here remains a participation of groups managed and sponsored by foreign states.

In this regards, there were noted the attacks conducted on the Polish President's website and stock exchange website, as well as on some websites of public administration institutions. The „Cyber Berkut" group claimed its responsibility for the mentioned attacks, giving alleged incorporation of Poland into the conflict situation in Ukraine (Raport:2014, p.38). Computer Security Incident Response Team underlines that the Internet and social media – on account of availability and the easiness of using them – became also the tool applied for assisting military and intelligence actions led by the states through the effective usage of the propaganda and disinformation actions. Analysis of Internet discussions in social media during last year indicated a precipitated, increased and unnatural usage of this subject in the activity of Internet users (the so-called trolls which give comments to the Russian Federation actions connected to the Crimea annexation and conflict in Ukraine). Comments of this type literally "flooded" Polish information portals in the initial phase of the Ukrainian conflict (Raport:2014, p.48).

5. WAYS OF OPPOSING HYBRID THREATS

Hybrid character of the armed activities, including the spectrum of measures applied in the Russian-Ukrainian conflict, constitutes today the main challenge for the state authorities, as well as the reactivation of defensive systems or decisiveness of international security organizations. The reply to such a threat must assume multidimensional and international character. It requires creative thinking and appropriately coordinated combined activities of different institutions, services as well as applying untypical tools and capabilities (Fryc:2015, p.66). In Poland it was paid attention to hybrid threats both in *the National Security Strategy of the Republic of Poland* and *in the White Book on National Security of the Republic of Poland.* In the *Strategy* attention is being paid to the fact that in adverse circumstances military threats to the security of Poland can appear and they can take the form *of armed conflicts of different scales - from the military action below the threshold of the classic war, to less probable conflict on a large scale* (Strategia:2014, p.20). In the *White Book* attention is turned to the fact that in the foreseeable perspective high probability of the out of the

territory conflict appears. This means such a form of threat in the frames of which the opponent is not aspiring for taking control over an attacked territory but uses the measures with consciously limited range, and unknown authorship which are calculated on „disarmament" of legal mechanisms of security and in such a way forcing the attacked party to lead independent military actions in conditions of the international isolation in the result the so-called hard agreement situations (Biała 2013, p.128).

In hybrid war context regulations of the Strategy are still valid and they concern the state created strategic resistance to aggression. Military and non-military actions are aimed at increasing the unavailability of the territory, universality of non-military structures defensive preparation, as well as weakening effectiveness of the armed forces support including the possibility of organized resistance on areas occupied by the aggressor (Koziej:2016, p.84). Under the strategic resistance of the state it is necessary to understand *capabilities of resistance and surviving aggression through: a) defensive preparation of the society (defensive and patriotic awareness of the nation, ability to behave properly in the face of armed aggression); b) increasing the operational inaccessibility of the territory (operational preparation of the territory, secure infrastructure); c) irregular and supporting activities of different state structures reinforcing regular actions of the operational armies* (Słownik).

Leading and organizing irregular actions on the territory occupied by the hybrid opponent should be performed above all by Special Forces. Nowadays there is no possibility to think about the above mentioned in categories of ancient, traditional guerrilla formations. Therefore one should consider directing the Special Forces to the national defense, increasing their number and organizing training with the other state structures on the territory of the state (Koziej:2016, p.87). Non-military security institutions should also ensure the security for the state structures, citizens and critical infrastructure against hybrid threats. This should be connected with the need of the definition of tasks and preparation of the police, secret services, self-government guards or security agencies and formations for property security (Koziej:2016, p.87). Generalizing it is possible to note that the idea of the system of resistance created in Poland is based on the coordination of various activities in many security sectors (legislative, operating, training, organizational, technical etc.) serving for the increased strategic resistance of the country to threats.

Poland takes into account that in situations of leading aggressive actions by the Russian Federation between binary borders of war and peace it would have to react independently, for a longer period

of time and in some cases all the time even. Therefore it is considered that it is necessary to prepare for hybrid threats, especially subliminal ones. The basis for the external state security assurance is proper deterrence policy which can have both offensive (retaliatory) as well as defensive (discouraging) dimensions. In offensive deterrence one should use the maximum range of the allied potential (nuclear and conventional) and build up own capabilities in a selective way (Koziej:2015, p.4). It seems that the best measure to stopping, inhibiting and deterring the potential opponent from using such a strategic method is deploying the allied NATO armies on territories of the border states (Pach:2016). However, taking into consideration the duration of reaction, permanently placed bases with equipment would be the most advantageous. In such a way the potential aggressor have to calculate into its plans that if he encroaches on the territory of the NATO state, he will enter into the conflict not only with the attacked country but also with the forces of its allied states. In the significant degree it should moderate its aggressive intentions (Pach:2016). However, conventional deterrence can turn out to be insufficient. Nuclear deterrence is more effective, especially in the situation when there is a lack of agreement of the Alliance on permanent stationing of the impressive forces on territories of the new Alliance members. It seems that in current political conditions the conventional deterrence combined with the nuclear will bring the best effects. A signal towards changes in the nuclear policy was made by the Polish F-16 aircrafts which took part for the first time in history, in the NATO nuclear exercise in 2014 and, by the informal offer of the vice-Minister of Defense Tomasz Szatkowski's from the end of the last year about stationing in Poland American nuclear tactical weapon (Sauer:2016, p.2). The best strategy for the blackmail with the nuclear weapon is creating the balance between potential incomes from the blackmailing and the scale of risk which is connected with it (Pach:2016).

The process of building capabilities for credible military deterrence in Poland was determined by „the Polish fangs" („Polskie kły"). The transformation and modernization efforts taken in the frames of the military potential lead to development of selected capabilities, which in the land, air, sea and cyber dimension will be able to deter the opponent effectively and dissuade him from the intention or attempts of conducting the armed operations against the Republic of Poland. In this case, the essence of classic dimension of deterrence is supposed to be the capabilities' achievement (by the Polish armed forces) for precise fire and counteraction for the wide spectrum of asymmetric threats (Fryc:2015, p. 69).

Apart from building up the system of the strategic resistance of the state to aggression and deterrence, it seems that in counteraction to comprehensive hybrid threats the most crucial is the use of the national power (Kitler:2010, p.118). It will be possible to perform this through integration of the national security system. It is intended to be created the Committee of the Council of Ministers on National Security and strenghten the Government Centre for Security as the Staff body of this Committee. Unfortunately the security of Poland is still being managed minister-centered. There are distinct systems of defensive and crisis reaction planning and management which reach the main office, through ministries, county offices, up to self-governments. The integrated and comprehensive approach is missed. It is necessary to integrate substantially the main strategic documents in the state concerning the security issue. The system of security management integration requires also the regulation of the law provisions, which is possible to be reached by preparing the act concerning the national security management (Koziej:2015, p.3).

Taking into consideration the biggest Polish vulnerability on hybrid threats, manifested in the form of political and military pressure mainly performed in information sphere and cyber sphere, it seems that the further priority is building up the effective information security system with a well-organized sector of cyber-security (Koziej:2015, p.4). The strategic target in the information security sphere is to insure the secure functioning of the Republic of Poland in the information space, taking into account information security of the state structures (especially public administration, security and public order services, secret services and armed forces), private sector and civil society (Projekt:2015, p.5). It is necessary to create and develop information security units (including cyber-security) in defense and protection (military and non-military) elements of the national security system. These should be the structures ready for tasks performing both in defensive and offensive character (Koziej:2015, p.5). The strategic objective in cyber-security sphere of the Republic of Poland (which is formulated in the *National Security Strategy*) is providing security for the functioning of the Republic of Poland in the cyberspace, including the appropriate level of security for the national information and communication technology systems (ICT) – in particular state ICT critical infrastructure – as well as for the key private economic entities: financial, energy, and health care (Doktryna:2015, p.9).

It is also particularly significant to ensure the sovereign operating and technical rule over highly advanced ICT systems of fight and support including management systems

(having at one's disposal source codes of their programming). Over-ministerial coordination of these issues is an important task as part of building up the integrated system of managing the national security (Koziej:2015, p.5). The above mentioned is based on the assumption that one of the hardest management aspects in crisis situations resulting from hybrid threats is the aspect of communication and working out common situational awareness, cyberspace and information sphere becoming the most prominent fields of conducting the fight and the forefront. The correct detection of the activity of the opponent and the correct functioning of the early warning system in the very two areas will decide about the capabilities for conducting of preventive operations in other dimensions concerning state security and its citizens (Liedel: 2015, p. 56).

6. CONCLUSION

In the situation of comprehensive influence of the entire Russian state against the West (which is being treated by Putin as threat), the need of having a strategy to counter hybrid threats becomes a priority. Achieving the agreement between NATO and UE and preparing the common strategy could be the representative solution. NATO should perform the leader's role in such areas as preparing the military reply, reconnaissance and scaring off and in case of a needed intervention. It seems that in peaceful times the best element of scaring off is permanent presence of the NATO armies on the territories of the most endangered countries. EU should be responsible for counteraction in the cyberspace, energy and migration policy, and counteractions for propaganda. The aspiration to achieving the synergy in all the instruments available of both above mentioned organizations should be intentional (Banasik:2016c, p.68).

East European countries facing hybrid threats, in spite of the fact that they are in the Alliance, must change their fundamental security strategies and defensive structures. Neither NATO nor EU will guarantee the absolute security of member states in the face of hybrid threats but will certainly help in building the resistance towards them. The identification of the capabilities which the state must possess (not only its armed forces) will be a big challenge for planners. As a result of that it will be necessary to change the entire process of defensive planning in such a way that to concern also non-military areas. Undoubtedly it will be necessary to increase defensive budgets, but it is not known whether the ambitious declarations taken at the Summit in Newport (concerning the allocating of 2 % of the GDP for defense) will be efficient in practice. Certainly it will be necessary do introduce changes in NATO and individual member states defensive planning. The need for creating legal and procedural mechanisms of fast using of armed forces and

synchronizing them with other non-military instruments became the priority. Centralized management on the governmental level will guarantee the integrity of all instruments and send coordinated counteraction to hybrid threats (Banasik:2016c, p. 69).

It is recommended to aspire to the integration in the frames of one security management organization of all the institutions (military and non-military, administration and media, military and uniformed forces, diplomacy, politics, NGOs, humanitarian, information etc.) with the aim of using the potential and gaining the synergy effect in the state security system. On the governmental level there is the intention to develop capabilities for the diagnosis and estimation of the threats in cooperation with NATO and winning the capabilities for the response to hybrid threats also through integrated conventional-nuclear scaring off. On the Ministry of National Defense level the change of previous law regulations is rather justified with the purpose of enabling the usage of the armed forces entire potential in peaceful times. The priority is to develop capabilities like unmanned systems of reconnaissance and classified communication to defensive and offensive activities in cyberspace and strategic communication. Goal-directed activities include also development of cooperation with paramilitary organizations and other civilian entities acting in the defense area in order to use their potential and capabilities for counteraction to hybrid threats (Banasik:2015a, p. 25).

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NATO RESILIENCE STRATEGY TOWARDS RUSSIAN HYBRID WARFARE

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Faced with the greatest security challenges of this generation, the Nord Atlantic Alliance is currently implementing the most significant strategy for strengthening its collective defense capabilities since the end of the Cold War. While the public attention has focused on NATO's military adaptation, the concerted efforts to strengthen the Alliance's ability to withstand and recover from a military attack, have so far been less visible. However, this is changing. At the 2016 Alliance high level meeting in Warsaw, NATO leaders agreed on an unprecedented commitment to "increase resilience". The 28 Allies work urgently to put this commitment into practice. But how to understand this NATO resilience?

Key words: *resilience, hybrid warfare, cyber space, emerging threats, civil preparedness, civil-military readiness.*

1. INTRODUCTION

Already during the Cold War, resilience has been conceptualized to anticipate and resolve disruptive challenges to critical functions and to improve combat as direct or indirect attack. However, given the intensification of globalization, the evolution of technology and the vast and precise information, the diversity of communication channels as well as the evolution of resistance to hybrid warfare, the concept needs to be reinvented for the information and knowledge era, starting from the premise that there is a strong interconnectivity between civil, private and military sectors. (Joseph S. Mayunga, 2007)

The renewal of the Alliance's focus on resilience is based on the recognition of two inconvenient but increasingly important trends. First of all, today's armed forces are increasingly dependent on the capabilities and infrastructure that are owned or operated by the civilian environment. To ensure access to these capabilities, NATO requires a solid civilian training in the allied nations, both in the public and private sectors.

Secondly, civilian services and infrastructure are potentially vulnerable to external attacks or domestic problems - and such vulnerabilities could be exploited by potential opponents. Not only could the Alliance's military capabilities be indirectly attacked, but civilian functions could become a major target. In a time of hybrid threats, strengthening resilience, primarily by improving civilian training and cyber defense, is therefore a critical component of NATO's efforts to discourage and defend against the whole range of threats.

2. DEFINING RESILIENCE IN SECURITY

The term "resilience" is used in many contexts. The concept has been appealing for areas that involve the management of complex interconnected systems, and has therefore spread beyond its initial use in ecology. It is now applied at different levels (individual, community, state) and in various fields such as psychology, infrastructure management, economy, organizational management, community studies, etc.

Until now, the most popular use in the field of security has been in the human disaster preparedness and counter-terrorism. In the area of cyber security and critical infrastructure protection, it can be considered that they are still working.

Following Russia's promotion and implementation of hybrid warfare, resilience is now a popular concept within NATO and the EU, conceived as a way to build a strategic and holistic response to this threat, combining perspectives such as "the whole government", "the whole society" and "the whole alliance", thus applied in multiple areas of interest for the security zone.

In general terms, resilience has been defined as "a process linking a set of adaptive capabilities to a positive path of operation and adaptation after a perturbance."

This definition implies that resilience is a process, although it can also be seen as a strategy or as "the ability of a system to maintain its functions and structure in the face of internal and external changes." (Brad Allenby and Jonathan Fink, 2005)

It is based on certain system resources and the dynamic attributes of those resources (robustness, redundancy, speed). This perspective allows for a proactive approach to build resilience by accumulating the necessary resources in a system and ensuring that these resources possess the necessary dynamic attributes at a time when disturbances occur.

System managers can thus develop policies (such as principles, norms and standards, investment priorities) that lead to resilience. This is especially true for enhancing cyber security.

The EU's global strategy defines resilience: "the capacity of states and societies to reform so they resist and recover from internal and external crises," which aligns well with the generic definitions of resilience described above. This reflects that the EU's understanding of resilience refers to change, adaptation and recovery capacities. The emphasis on reforms stems from one of the key of the EU - the projection of its soft, normative, stabilizing, reforming and transforming power of countries requiring membership or associate status. However, when it comes to internal resilience, it is more about critical infrastructures, networks and services than about values, norms, institutions, or reforms, rather than something that has to be protected against the attempts and erodes Member States from within.

NATO focuses on infrastructure, civilian training, continuity of services, accumulation of reserves and access to them, as well as various procedures that facilitate a rapid response to the crisis. Its major concern is that the Alliance relies heavily on the private sector when it moves, deploys and supports its forces; therefore, pays great attention to civilian capabilities and civil-military interaction.

This is understandable given its role as a "military response" and "multiplier of force" in military conflicts. Like the EU, it should not neglect its role of helping countries - both allies and partners - to maintain their capacity to reform themselves in the face of adversity.

As Jamie Shea also noted (Jamie Shea, 2006), NATO and EU roles in supporting the resilience of the most vulnerable and exposed countries often overlap, especially in areas such as cyber security, strategic communication, civilian preparation, and combating Russia's hybrid war.

Although Russian hybrid combat techniques have been extensively analyzed, it is difficult to predict when, where and what types of interventions will be created and exploited by Moscow or other adversaries - to attack / affect the target countries. Russia's approach usually combines both the application of long-term pressure (e.g. hostile propaganda and economic warfare) and the opportunistic administration of sudden shocks in the short term, making it impossible to identify a single set of capacities needed to counteract hybrid strategy.

Enhanced resilience of potential targets - allies and partners - addressing a wide range of vulnerabilities is of vital importance if NATO, in cooperation with the EU, tries to block Moscow from reaching its political and strategic goals in relation to the Alliance and its partners.

Equally important is the alliance's correct assessment that Russia will continue to undermine NATO's legitimacy and credibility

so that nations feel helpless and have no choice but to accept Moscow's geopolitical demands. The alliance's efforts - through strategic communication, public diplomacy and public mobilization - to ensure a high level of trust and support in its core tasks, policies and strategies among the general public of allies and partners, and the constant belief that "no one will not be left behind" when encountering difficulties, are fundamental to counteract this. It is just as important that NATO's proactive efforts remain legitimate, relevant, visible, coherent and credible in terms of supporting the most vulnerable nations (so-called "forward resilience").

In strategic terms, resilience can be seen as a deterrent or "the conviction of the enemy not to attack by believing that his attack will be defeated - that means that he will not be able to achieve his operational goals." (David Yost, 2003)

Hybrid war strategy - is essentially a strategy designed to cause disturbances, confusion, destabilization, and paralysis (for example, modeling the behavior of the target nation) - and can be countered by demonstrating that all of these goals are not achieved due to the strength of the target.

E.g.:

- a high level of the competence of a society in critical thinking and the understanding of the nature of such hybrid war instruments, such as hostile propaganda, political extremism, social protest campaigns or military intimidation - along with the trust of society in the integrity of the political system, the leadership policy and government communication - can eliminate the benefits of these instruments.
- a strong sense of belonging to a community, citizen empowerment and economic equity, as well as mutual support available, reduce the potential for division and polarization of society and the countering of various groups of society against the others and against the nation's institutions.
- a high level of volunteering and civic participation in state actions, when promoted by national security and defense institutions, substantially strengthens these organizations in front of their adversaries.
- measures aimed at seriously disrupting economic activities (e.g. sanctions, energy supply disruptions, financial destabilization, etc.) fail to achieve the desired long-term effect when faced with high levels of economic development.
- theabilityofcriticalinfrastructure, including communication and information systems, to absorb the impact of sabotage or attacks, rapid adaptation and continued delivery of a satisfactory level of service make it unnecessary to exert pressure in this way.
- sufficient and quickly accessible financial capital, basic

needs (such as food, fuel, medical supplies) and technical resources (e.g. spare parts and materials for infrastructure maintenance and repair) ensure that sudden shocks caused by aggressors does not translate into a negative impact on the nation's will to persevere.

The challenge is to convincingly prove that the vulnerabilities are really missing and that a particular society is indeed resilient from all points of view. This starts with knowing your own vulnerabilities as society and then striving to eliminate them. The problem here is that the process of addressing the different vulnerabilities can affect the power relations in nations, and therefore we must always address the pertinent question of who are the winners and losers of the process of building social resilience.

Some of these "losers" are forced to become, consciously or not, the natural allies of an aggressor in a hybrid conflict - which is evident not only in countries like Ukraine or Georgia, but even among the political or economic elites of some NATO Allies.

Last but not least, discouragement subsides into the aggressor's perception, which means that an opponent must be convinced enough that the target society is too resilient to give up the hybrid approach to war.

This is difficult to achieve, since each adversary is driven by logic's rationality and own calculations, and can assess the resilience of the target very differently. This, in turn, means that Russia will never cease to try to identify vulnerabilities and then constantly test a target nation.

Therefore, the Alliance must continually develop and maintain a profound and sophisticated understanding of its allies and partners about the vulnerabilities, resources, capabilities and potential "defeated" resilience policies, as well as about Moscow's thinking and calculations of these vulnerabilities.

The Alliance firmly assumes that cyber-domain is one of the areas in which NATO can exercise its collective power to address the critical vulnerabilities of its allies and partners and to strengthen its resilience. Perhaps this is one of the most promising sectors in which civil-military synergies, public-private partnerships, EU-NATO cooperation and the involvement of NATO partners can be pursued to achieve the desired effect. It is also the sector where negative impacts (e.g. paralyzing cyber-attacks) have an impact on several sectors of the nations (financial systems, industrial production and distribution, energy supply, foreign trade, government services, communications, media etc.).

3. REINVENTING THE CONCEPT OF RESILIENCE FOR NATO EFFECTIVE DEFENSE

Resilience is not a new task for the Alliance. The article III of the Washington Treaty states that allies have an obligation to develop and

maintain the ability to withstand the armed attack. As has been said, "defense begins at home".

Long before the emergence of cyber threats and hybrid war, this notion of resilience has always been understood to overcome the limits on military capabilities.

Since the 1950s, NATO has implemented policies and civilian training plans. By the end of the 1980s, the Alliance had maintained plans for eight NATO civilian agencies, which could rise in times of crisis or war to co-ordinate and direct efforts, from the allocation of industrial resources and oil supplies, food production, civil transportation, refugee flows management.

The NATO Heads of State and Government reiterated and confirmed this approach at their Warsaw Summit on 8-9 July 2016, with the commitment "to increase the resilience, it requires that all the Alliance's members to maintain and further develop their individual capacity and collective efforts to withstand any form of armed attack. In this context, we are today committed to continuing to improve our resilience to the full range of threats, including hybrid threats, from any direction for a credible defense and effective fulfillment of the Alliance's main tasks." (NATO Summit Guide)

Consequently, the European Union and NATO are investing in strengthening the capacities of partner nations to fight against hybrid threats. The European Union's global strategy provides for this purpose: "It is in the interests of our citizens to invest in the resilience of states and societies to the east stretching into Central Asia, and south down to Central Africa. A resilient society featuring democracy, trust in institutions, and sustainable development lies at the heart of a resilient state." (Shared Vision, Common Action: A Stronger Europe, A Global Strategy for the European Union's Foreign And Security Policy)

A particular importance is cooperation with the private sector. (HARRES, 2016) The army is becoming more and more dependent on infrastructure and private sector assets. NATO, for example, faces two distinct but interdependent challenges: first, ensuring that it can quickly move all the forces and equipment necessary for mission areas when faced with an imminent threat or attack; and, secondly, Member States should be able to anticipate, identify, mitigate and recover from hybrid attacks with minimal impact.

Resilient systems and organizations must maintain a certain functionality and be able to maintain control while they are being attacked. To this end, three elements are considered important:

1.the capacity to work under heavy conditions;

2.the ability to recover quickly;

3.the ability to learn from experienced attacks.

The NATO allied Command Transformation (ACT) identified four "areas of concern" with potential to increase resilience:

- Identifying key vulnerabilities and associated risks this allows governments to develop responses and appropriate mechanisms to manage the consequences of orchestrating all appropriate power tools both nationally and internationally.
- Synchronizing the trans-governmental decision-making process - combating hybrid threats requires a different government approach that covers security mechanisms better than in the past. Political and military decision-makers need to be able to handle opponents attacking their own centers of gravity.
- Creating military sustainability and civilian training - the civilian population is not just a potential victim; at the same time, it is a critical source of resilience. Civil education allows military sustainability, while military capabilities protect its population and prosperity.
- Balancing the allocation of available resources - strengthening the links between civil, private and military sectors will allow cost sharing at the same time. It provides for the development of mitigation tools, such as diversification of supply, resources and services.

Each area of interest provides a prism for discreet analysis. As a military project, resilience must be measured in terms of training, with well-defined training standards. The resilience of the civil education project must be organized with defined standards and a high level of training to achieve this. Simulation exercises based on scenarios can be a catalyst for learning in complex emergencies - for civilian and military actors, but especially for civil-military cooperation.

From the ACT perspective, these "areas of interest" could serve as a bridge between the present and the future and will provide a measurable change, given the basic question: how quickly a system attacked by any combination of disruptive effects can reach a stable status?

CONCLUSIONS – RESILIENCE IS ABOUT NATIONAL TO INTERNATIONAL

The starting point for dealing with hybrid challenges and building the necessary resilience is the situation awareness. This requires, first of all, a common understanding of their own vulnerabilities, in other words a common assessment of the risks to their own critical vulnerabilities, their own weight centers, but also an understanding of what perceived by the opponents, as they could exploit these perceptions. We should probably take a deeper look to all this.

Dedicated mechanisms are needed for the exchange of information. The rapid identification of a hybrid attack is a critical prerequisite for timely decision making for early

engagement and escalation blocking. Hybrid threat indicators and existing risk assessment mechanisms should provide for early warning.

Security risk assessment methodologies should inform decision-makers and promote risk-based policy formulation in areas ranging from aviation security to terrorist financing and money laundering. Intelligence and information exchange have become even more important. The knowledge network is essential for organizational learning and adaptation, for training and education, and last but not least for operations - thus providing knowledge that can be applied.

Exercises and training programs must reflect recent developments and responses to hybrid warfare. They will help develop a common understanding of threats and vulnerabilities, tools and mechanisms and improve integrated decision-making. (Norris and all, 2008)

To this end, common civil-military education, training and exercises - to include high-level training - must use the best possible applications in future and advanced generation learning methods - collective training and the promotion of knowledge development for interdepartmental and coalitions interoperability.

Recently, NATO ambassadors and defense ministers have organized simulation exercises and scenarios to test their awareness of the situation and their reaction to hybrid threats. Obviously, it was a wake-up call for many. Also civilian leadership and civil-private-military interaction must improve how to respond to challenging hybrid threats.

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ALGORITHM FOR MILITARY AUTOMOBILE CARGO TRANSPORTATION PLANNING AND ITS MATHEMATICAL MODEL

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In the article, with the aim of technical supply of military facilities, the algorithm and the mathematical model of automobile cargo transportation planning and the method for the evaluation of effectiveness are introduced.

Key words: *military automobile cargo transportations, method of effectiveness, effectiveness indicators, method of evaluation, planning algorithm, mathematical model.*

1. INTRODUCTION

The management of shipping is not possible without designing high quality planning on effective utilization of transport means. The key issue in transportation management is defining of itineraries providing with optimisation factors and the identifying the transport means for those itineraries. Reports on trips, technical-exploitation parameters of transport means (carrying capacity, coefficient of being in good condition, the number of trips, the cost of one trip for either model of an automobile, etc.) should be taken into consideration.

In accordance with market terms and conditions, minimum transportation expenses are taken as a major optimization criterion. However, the effects on transportation process have multiple factors, therefore, approaches to the solution and the selection of the optimization criterion become pretty much different.

The transportation plans developed in the concerning departments of Military Forces should provide the supply system with minimum expenses, and the optimal indicators. It creates some difficulties to define optimization measures of shipments as the effectiveness of automobile cargo transportation depends on many factors in the Armed Forces of Azerbaijan Republic [1].

2. BUILD UP THE ALGORITHM AND MATHEMATICAL MODEL OF PLANNING OF AUTOMOBILE CARGO TRANSPORTATIONS.

By using the theory of Graphs, the process of automobile cargo transportation could be considered as a stream in the network. Let us fix a pick point of graph on either store, may the length of the arcs be the distance among the points.

Optimal organizing algorithm of shipments could be described as following by considering the possible itineraries, restrictions on carrying capacity of the transport means, their number, types and assumption on theirconditions, the number of stores and consumers, etc:

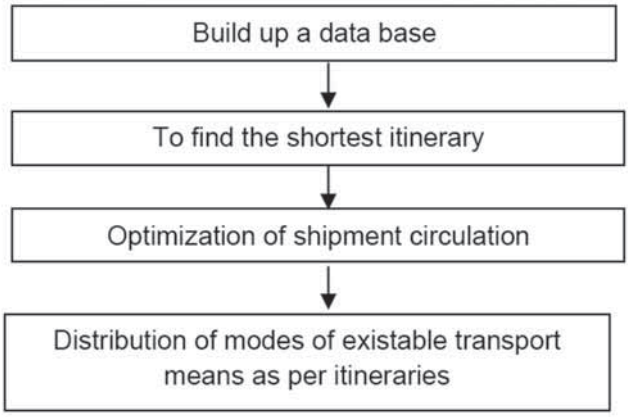

Fig. no. 1. optimal organizing algorithm

Let us take the following marking in order to build up a data base:

- l_{ij} – distance between i and j numbered points;
- m – quantity of stores;
- n – quantity of consumers;
- a_i – volume of product in i numbered store;
- b_j – order by j numbered consumer as per plan;
- K – the quantity of modes of transport means;
- c_{ij} – expense per kilometer of the route from i point j point;
- g_k – capacity of transport mean of k numbered model;
- N_k – the number of transport mean belonging to k numbered model;
- s – the quantity of all summits in the network.

In the second phase, the shortest distance between the points is found by applying l^*_{ij} Bellman-Shimbel algorithm [2]:

$$l_{ij}^{2k} = \min_{1 \le \lambda \le s} \left(l_{i\lambda}^{k} + l_{\lambda j}^{k} \right), \quad k = 1,2, \ldots$$

In the third phase, transport issue with the classic linear programming is solved:

$$\sum_{i=1}^{m}\sum_{j=1}^{n} l_{ij}^{*} x_{ij} \rightarrow min;$$

$$\sum_{j=1}^{n} x_{ij} \leq a_i , \quad i = \overline{1,m}$$

$$\sum_{i=1}^{m} x_{ij} = b_j , \quad j = \overline{1,n}$$

$$x_{ij} = [x_{ij}] \geq 0 , \quad i = \overline{1,m} , \quad j = \overline{1,n}$$

$$\sum_{i=1}^{m} a_i \geq \sum_{j=1}^{n} b_j .$$

By solving the given transport issue, one gets the matrix of shipment stream (xij)m,n (shipment turnover) and, the mass of the shortest itineraries are formulated among repositories and consumers. Let us assume their number as *L*.

And at the final stage, the issue of distribution of transport means defined at the third stage is solved:

$$\sum_{k=1}^{K}\sum_{l=1}^{L} c_{kl} y_{kl} \rightarrow min$$

$$\sum_{l=1}^{L} y_{kl} \leq N_k , \quad k = \overline{1,K}$$

$$\sum_{k=1}^{K} g_k y_{kl} \geq G_l , \quad l = \overline{1,L}$$

$$y_{kl} = [y_{kl}] \geq 0 , \quad k = \overline{1,K} , l = \overline{1,L}$$

In here G_l is the amount of the shipment, defined at the third stage for ^{l} itinerary, and y_{kl} is the number of the transport means from k model, which is supposed to move through ^{l}.

Automobile cargo transportation plays a crucial role in preparing the troops for combat as well as in providing the combat ability. Therefore, the purpose to work out the method of evaluation of military automobile cargo transportation is to define operability of these transportations, their implementation in accordance with plans, eceonomic efficiency and to evaluate necessary proposals for increasing its effectiveness [3].

As a result of conducted researches very interesting parameters and criterions, which affect the effectiveness of cargo transportations have been defined. They are the following:

• the length of the overcome route during the transportation S_d;

• overall time $T_{d,}$ spent for transportation;

• transportation speed v_d ;

• effective utilization of nominal capacity of automobiles;

• minimization of overcome distance of an automobile without cargo (Syz), or percentage ratio of overcome distance without cargo to the total travelled distance ($\frac{S_{yz}}{S}$x 100%);

• reducing the cost of transport service ($\frac{x_d}{M} \rightarrow min$) in shipments;

• increasing the transportation effectiveness ($\frac{M}{T_d} \rightarrow \max$) in;

• increasing of advantageous expences F_x in transportations.

$$\sum_i \sum_j l_{ij} \rightarrow min$$

In the course of the transportation, the length of total route Sd–is the sum of distances overcome by vehicles involved in transportation during the calculation period. The most appropriate itinerary for the delivery of the cargo from point i to point j is found by calculation of the shortest route by employing network model or by applying the criterion of seeking the most secure route ($\min_i p_i^k \overset{k}{\rightarrow} max$).

$$\sum_i \sum_j l_{ij} \rightarrow min$$

Here, in p^k_i is the probability of the cargo delivery to i numbered consumer in k numbered version. For the period of calculation, $\mathbf{S_d}$ could be used as a constant in the evaluation of effectiveness indicators by calculating once (if the distance between the points does not change).

The total time spent on transportations T_d is the sum of transportation time spent by the vehicles involved in the transportations during the calculation period. When we talk about the shipment time for per vehicle *(unlike the transportation implemented in civil organizations),* we imply the time spent by a vehicle for travelling from the parking lot of the military unit till the determined point (where it receives cargo), loading duration as well as its delivery to the destination and unloading process.

The minimum value of this criterion, on its turn stimulates some effectiveness indicators to become closer to the optimal rates. But, the abnormal activity (that is to say, a system which doesn't provide effectiveness factors close to optimal values) of the real transportation could disturb this kind of dependence. If a vehicle spent more than a day on transportation, while calculating T_d – for that vehicle, resting time for the personnel and time for other things are to be taken into consideration.

Increasing of T_d for each vehicle could led to the decrease of the technical readiness co-efficiency of the military unit to which it appertains ($n_{a.faktiki}/n_{a.siyahı}$, in here $n_{a.faktiki}$ actual number of the vehicles in good condition, $n_{a.siyahı}$ is the number of the vehicles on the records) and combat readiness of the military unit.

Despite the application of modern information technologies on transportations, documentation process requires plenty of time. For instance, preparation of orders and substantive documents, submission of documents to the Transport Service of the Ministry of Defence, obtaining documents for distribution etc. could result in increasing of T_d [4].

The study of recent years indicates, that the Automobile service superiors of military units are mainly involved in the execution of this work. Since the most of military units are located 300 km far from the center, three days is required for document processing and the delivery of a property by the transport to a military unit. This, in its turn, by increasing Td , could negatively affect not merely the effectiveness of the transportations, at the same time the security of a military unit. Preparation for shipments and its negative impact on security of a military unit is characterized by non-execution of occupation duties of a service commander (inaction in the volume of "special volume"

during combat readiness), and also by minimizing of technical readiness co-efficiency. From this perspective, minimization of T_d criterion has a positive effect on the growth of transportation effectiveness.

In cases, where the shipments are executed directly (when the delivery is implemented from unloading point to the loading one by the same vehicle) daily transportation distance is considered 250–300 km with one driver, and 550–600 km with two drivers. In this case, the duration of the driving is considered 12–14 hours per day with one driver, and 17–18 hours with two drivers a day [5].

Considering these, T_d – could be indicated by the following formula:

$$T_d = T_h + T_{y.b} + T_{dinc.} \quad (1)$$

Here T_h is the on moving time, hour, $T_{y.b}$ – time, hour spent for loading and unloading process, and for the wait ,the time, hours spent on t; $T_{dinc.}$ – the time or hours spent of the dirver's resting and stops(brake) while moving.

Transportation rate v_d – is the correlation of algebraic sum of routes, overcome by vehicles, involved in the transportations during the calculation period, to the total time T_d spent on the transportations and is calculated with $v_d = \frac{S_d}{T_d}$ formula. If the period of calculation is $S_d = const$, the realization of $v_d \rightarrow max$ criterion would depend on $T_d \rightarrow min$ terms.

While effectively using the load-carrying norms of vehicles, involved in the transportation the realization of is proposed.

$$\frac{\sum_{i=1}^{n} m_i}{M} \rightarrow 1 \quad (2)$$

Here $\sum_{i=1}^{n} m_i$ is the sum of load-carrying norms of automobiles, mi – is the nominal load-carrying capacity of automobile *i*, and M – is the amount of the total cargo.

If we call the ratioas $k_m = \frac{\sum_{i=1}^{n} m_i}{M}$ the coefficient of utilization of nominal load-carrying capacity, (2) theoretically the most optimal (ideal) value of criterion would be $km=1$. In addition, by applying $\sum_{i=1}^{n} m_i \geq M$ (the sum of nominal load-carrying capacity of automobiles should not be less than the volume of the shipment), the limitation condition, one can meet the whole transportation reqiremnts. According to this criterion, the formul $(k_m - 1) \cdot 100$ % could be used as deviation percentage from optimal (ideal) value.

Minimization of the overcome distance of a vehicle without load (S_{yz}),

or percentage ratio of overcome distance without load to the whole distance ($\frac{S_{yz}}{S}$ x 100%) is possible in the case of sophisticated organization of Automobile Service planning, including transporation.

If we indicate the coefficient of unloaded driving as $k_{yz} = \frac{S_{yz}}{S}$, $k_{yz} = 0$ matches the most optimal level of the planning (loaded round trip of automobiles), and $k_{yz} = 1$ matches the most undesired situation (unloaded round trips of vehicles), that is to say theoretically $0 \leq k_{yz} \leq 1$ could be accepted for automobile transportations.

Coefficient k_{yz} totally characterizes automobile transportation executed during the calculation period. As value $k_{yz} = \frac{1}{2}$ characterizes the case of all automobiles, which travel the same route empty and return with load. In the case of $k_{yz} \in [0; \frac{1}{2}]$, we can consider that the transportations have been well organized. The case $k_{yz} = 1$ is only theoretically possible, and that means the vehicles, involved in transportations during the calculation period travel and return without load.

The case $k_{yz} < \frac{1}{2}$ is possible when at least some of the loaded vehicles travel from military units towards bases, and the case is theoretically possible, it corresponds to the case, where the vehicles deliver some shipment to bases and return to the military units with load.

In transportations the cost price of transport service is calculated as the ratio of X_d transportation cost to the amount M of the total transported shipments ($\frac{X_d}{M}$). X_d – is offered to be calculated with the following formula:

$$= S\left(0.01Y_n Q_y(1 + 0.01D) + \frac{Q_{AKB}}{N_{AKB}} + \frac{Q_{şin}}{N_{şin}} + \frac{Q_{AT}}{N_{AT}} + \frac{Y_n(k_1 Q_{my} + k_2 Q_{ty} + k_3 Q_{py} + k_4 Q_{xy})}{100}\right) + E_x G \quad (3)$$

Here X_d – is the shipment expences; S – the total overcome road, Y_n – fuel consumption per 100 km; Q_y - cost of 1 litre fuel, D – addition to fuel consuming norm; Q_{AKB} – the cost of batteries; N_{AKB} – exploitation norms of the batteries; $Q_{şin}$ – the cost of tyres; $N_{şin}$ – exploitation norms of tyres; Q_{AT} – the cost of automobile; N_{AT} –exploitation norms of automobile, Q_{my} – cost of engine oil; Q_{ty} – cost of transmission oil; Q_{py} – cost of plastic oils; Q_{xy} – cost of special oils (liquids); k_1 - k_4 – calculation norms for lubricating materials according to per 100 liter fuel consumtion; E_x – daily trip expenses; G – number of days.

X_d transportation costs depend on exploitation condition - road and climate condition of vehicles, including transport factors as well. Although the road condition, defined with a road construction remains

unchanged, visibility, adhesion coefficient of tires, traffic intensity, and weather are included into changeable conditions. Transport factors are characterized by models of utilized vehicles, the weight and sizes of freight, type and lot, as well as by transportation distance.

Since the consideration all influential factors in the calculation of X_d transportation expenses requires long time and a detailed report, some of them are accepted as an average indicator by simplifying and some are not taken into consideration (minor influential factors).

As the transportation itineraries remained same during the calculation period, the norms of fuel and lubricants, as well as and consumptions of automobile properties were applied according to appropriate orders of the Defence Minister, without adding supplementary coefficients.

If during the calculation period the same model of vehicles are utilized in transportation, X_d, will change depended on the indicators of S və E_xG. Although, the transport parking lot comprises, it makes necessary to involve the most useful models in the transportation, and makes necessary to provide the terms of $S, E_xG \rightarrow min$.

This, in its turn, make necessary the involvement in transportation of the most useful model, altough the parking lot comprises various vehicle models, and the realization of terms $S, E_xG \rightarrow min$.

Fertility of transportations is characterized by the correlation of the overall shipment amount M, to overall time T_d spent on transportations during $(\frac{M}{T_d} \rightarrow max)$ (calculation period [6]. The closeness of this criterion to the maximum indicator, first of all depends on appropriate planning of the transportation, the proper choice of vehicles in accordance with norms and standards and the abovementioned parameters.

Advantageous expense (F_x) means the expenses spent on transportation according to nominal load-carrying capacity of an automobile. It is important to provide the advantageous expense indicator $F_x \rightarrow max$ in order to increase the effectiveness of transportations. On this purpose, the amount of the property required during the calculation is to be defined in advance and the transportation si to be planned taking F_x into consideration. The calculation of advantageous expense for the calculation period is offered to be implemented with the following formula.

$$F_x = \frac{X_d \cdot M}{A_{yn} \cdot n_a} \quad (4)$$

Here n_a - is the number of the vehicles engaged in the transportation during the calculation; A_{yn}- is the nominal load-carrying capacity (in kilograms) norm of the vehicles utulized in the transportations.

CONCLUSIONS

In the article optimal organization algorithm of military automobile cargo transportations and its mathematical model have been offered, and based on them evaluation method of transportation effectiveness has been worked out. This method encompasses major criterion for effectiveness evaluation of automobile cargo transportations existing in auto technical maintenance system, and allows to find out their factual and optimal values, calculation of the expenses, and to implement economic evaluation.

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GIS TECHNOLOGY AND TERRAIN ORTHOPHOTOMAP MAKING FOR MILITARY APPLICATION

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In this paper, it is shown that GIS and photogrammetry technologiyes, determination of searching target coordinates for the operational desicion making are very important for the military application, for the combat control. With aim of orthophotomap making of the terrain and identification of terrain supervision there has been constructed 3D model for choosen mountainous terrain of Azerbaijan Republic using GIS technology. Based on this model there has been obtained a terrain profile and carried out mapping. Using ArcGis software there has been investigated possibility remain control on obserbvable and unobservable parties of terrain on supervision line from supervision point to target point.

Key words: *GİS, photogrammetry, orthophotomap, terrasın, unobservable object, geospatial technology.*

1. INTRODUCTION

Detailed information about territory, maps and other terrestrial pictures, calculation of coordinates are very important for organization and planning of military operations and combat control. Therefore, always geospatial information is necessary for solution of the military problems [1,2].

There could be such a critical situation during military operations that it might not be possible to observe terrestial targets, particularly targets of enemy located on mountainous terrain. In this type of case, there is indefinity in information thus the risk of wrong to decisioin-making process on destroying of the targets rises. Application of Geography Information System (GIS) technology is an optimal way to solve issue on 3D coordinate of hostile target and to define the distance [1,3].

There is an military application of geospatial technology, mapping and geographic information system (GIS) in Azerbaijan. Geospatial technology involve geodesy, mapping, photogrammetry, GIS and Earth aerospace remote sensing (EARS) technologies. In this paper we consider an especial branch of geospatial technology, that is a photogrammetry technology and military application for combat control. 3D model for choosen mountainous terrain of Azerbaijan Republic is constructed with aim of localization of unobservable objects using GIS technology. Based on this model there has been obtained a terrain profile and carried out mapping. Using ArcGis software there has been investigated possibility remain control on visible and invisible parties of terrain on supervision line from supervision point to target point.

2. TERRESTRIAL PHOTOGRAMMETRY TECHNOLOGY

The principal application of photogrammetry is to determine the spatial position of the natural and fabricated objects situated on the earth's surface (topographic application). According to the location of the sensor during data acquisition, there are three branches of photogrammetry: Terrestrial photogrammetry means that a ground based stationary sensor acquires the images. Aerial photogrammetry deals with images taken with sensors mounted on airborne platforms. Space photogrammetry embraces the processing of images recorded of the earth or of other planets from satellites.

Mathematical modeling can perform photogrammetric operations. This method is called analytical, numerical or computational photogrammetry.

Nowdays, the most of maps are made on the basis of EARS aerospace photographs. And the photogrammetry technology is one of the most important tools for development these aerospace photographs. An application of photogrammetry technology [4] provides an icreasing of effectiveness of the combat operation organization, an icreasing of operability of the decision making, pass ahead of enemy during development of information etc.

For the purpose of construction of the terrestial orthophotomap and 3D-model the photogrammetry technology is used in mapping. But efficiently determination of coordinats is based on the video surveillance, and for the present this technology isn't fully investigated and improved. Photographies camera development involves next stages: collection photographies in one space by use of the coordinates of projection centers, inclusion the reference points with precise coordinates and show these points

in photographies, determination of averaged connecting points between photographies, determination of the parameters of external orientation, construction and balancing of the space aerophototriangle network. After completion of these processes by use of photogrammetry cutting it is possible to determine of the coordinates of some point, to obtain 3D layouts of the objects, to construct of digital model of the relief, to obtain the error-free, connected and reduced to coordinat system orthophotoplane

That to obtain a high accuracy, before to make photography the photographic camera must be calibrate. It is known that there is a distortion in lens of photographic camera. This distortion is higher in small format consumer photographic cameras and so, there are large geometrical errors in obtained photographies.

Coordinates define the relative position of points in space in a reference system. Frequently used reference systems are the:

• *polar* coordinate system τ, θ in a two-dimensional space);

• *geodetic* (geographic) coordinate system (latitude ø, longitude λ and the height above the ellipsoid h);

• *Cartesian* (rectangular) coordinate system (X, Y, Z).

Most photogrammetric operations are performed in a right-handed Cartesian coordinate system.

At first of all, the external and reciprocal oriented parameters of pair of photographies are determined [5,6]. This, there are the values determined positions of photographies in the space in the moment of shooting (fig. 1): here, X_{S1}, Y_{S1}, Z_{S1} are the coordinats of projection center of a left photography; X_{S2}, Y_{S2}, Z_{S2} are the coordinats of projection center of a right photography; α_1, α_2 are the lengthwise slope angles on the S_1XZ and S_2XZ planes of the left and right photographies; ω_1 and ω_2 are the breadthways slope angles on the S_1o_1Y and S_2o_2Y planes of the left and right photographies; χ_1 and χ_2 are rotation angles of left and right photographies [2].

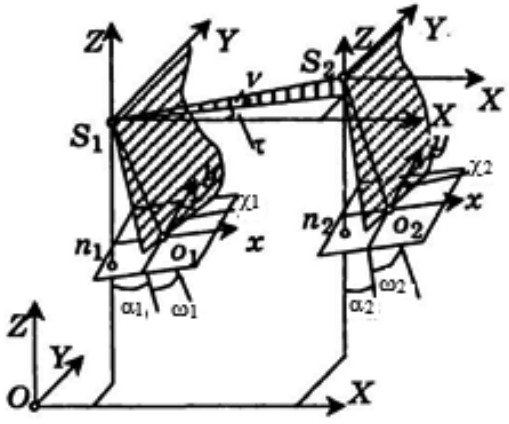

Fig. no.1. *External oriented parameters of pair of photographies.*

If we calculate a difference of external oriented elements of the left and right photographies then we can calculate a mutual oriented:

$$\left.\begin{array}{c} B_X = X_{S2} - X_{S1}, B_Y = Y_{S2} - Y_{S1}, B_Z = Z_{S2} - Z_{S1} \\ \Delta\alpha = \alpha_2 - \alpha_1, \Delta\omega = \omega_2 - \omega_1, \Delta\chi = \chi_2 - \chi_1 \\ tg\tau = {}^{B_Y}/_{B_X}, \; sin\nu = {}^{B_Z}/_{B} \end{array}\right\}$$

All of these procedures are made fully for all photographies. The model generated called a block (fig. 2).

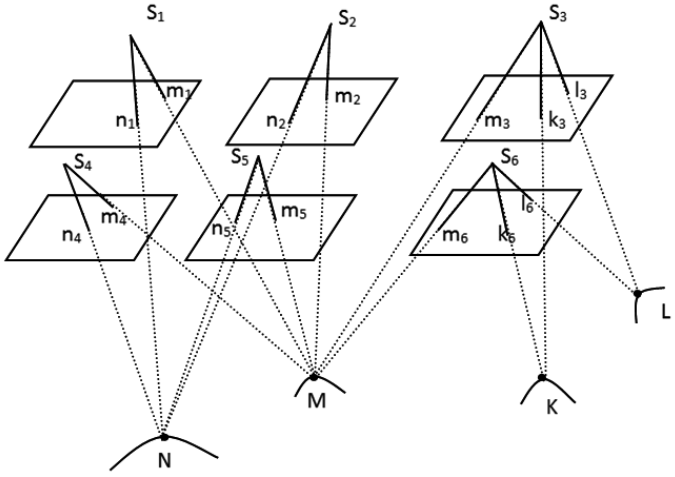

Fig. no. 2. *Photogrammetry block.*

The triangulation calculations in this block are fully balanced [7]. The balancing is carried out with mutual of least square technique. The balancing block is used for determination of parameters complex which find more precisely the coordinates of measured points between possible photographies. Let us assume, that there are n points in m photographies, and Xi,j is the projection of i point in the j photography. In depending on disposition i point on the j photography we have

$$\nu = \begin{cases} 1, i \in j \\ 0, i \notin j \end{cases}$$

If we adopt, that each j camera is parametrized by aj vector and each i 3D-point is parametrized by bi vector then balancing principle is:

$$\min_{a_j, b_i} \sum_{i=1}^{n} \sum_{j=1}^{m} \nu_{i,j} d\left[Q\left(a_j, b_i\right), x_{i,j}\right]^2$$

Here: Q(aj, bi) is expected projection of i point on the j photography, d(x,y) is a distance between photography's points described by x and və y vectors. As we can see that a balancing block leads to minimum of project errors. Then, the precise geodesic coordinates of the points of block net and the external orientation parameters of photographies are determined.

After determination of the internal orientation elements, the distortion parameters, the external orientation elements and the mutual orientation elements we can determine the coordinates of any points on the photography by straight photogrammetry cutting method. The sense of a photogrammetry cutting method is next. Let us, m1 and m2 are images of some M point of territory on P1 and P2 photographies shooted from out of S1 and S2 centres (Fig. 3).

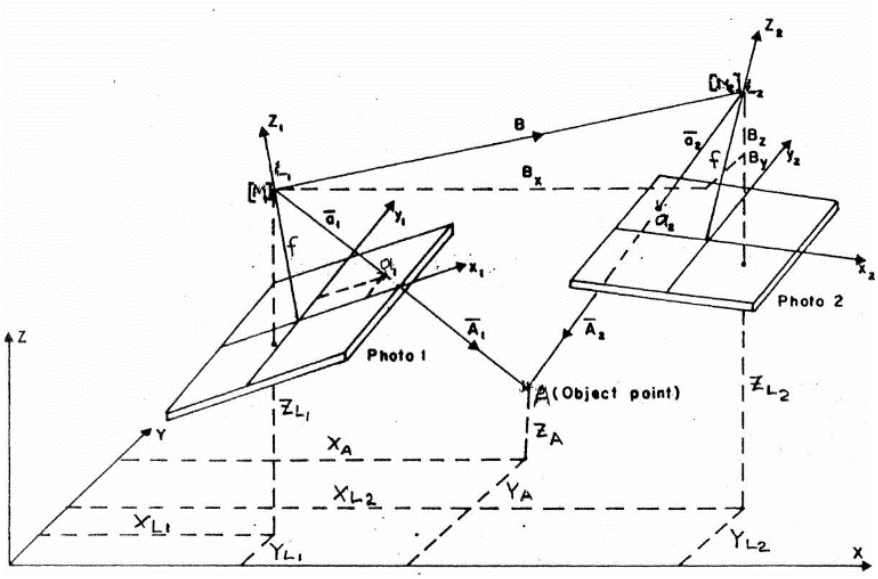

Fig. no. 3. *Straight photogrammetry cutting*

It is need to determine the coordinates of *A* point in *OXYZ* sistem (if the positions of photographies relative to this system). For this we must to solve below system of equations:

$$\left.\begin{aligned} X_A &= X_{S_1} + N_1 X_1 = X_{S_1} + B_X + N_2 X_2, \\ Y_A &= Y_{S_1} + N_1 Y_1 = Y_{S_1} + B_Y + N_2 Y_2, \\ Z_A &= Z_{S_1} + N_1 Z_1 = Z_{S_1} + B_Z + N_2 Z_2 \end{aligned}\right\}$$

Here:

$$\left.\begin{aligned} N_1 &= \frac{B_X Y_2 - B_Y X_2}{X_1 Y_2 - Y_1 X_2} = \frac{B_X Z_2 - B_Z X_2}{X_1 Z_2 - X_2 Z_1} = \frac{B_Y Z_2 - B_Z Y_2}{Y_1 Z_2 - Z_1 Y_2}, \\ N_2 &= \frac{B_X Y_1 - B_Y X_1}{X_1 Y_2 - Y_1 X_2} = \frac{B_X Z_1 - B_Z X_1}{X_1 Z_2 - X_2 Z_1} = \frac{B_Y Z_1 - B_Z Y_1}{Y_1 Z_2 - Z_1 Y_2} \end{aligned}\right\}$$

B_X, B_Y and B_Z are the coordinate differences beween projection centres.

3. TERRAIN ORTHOPHOTOMAP MAKING

By indicated above principle in depending on sizes of photographies pixels we can determine the coordinates of any point of a surface of the compact terrain or object. By-turn, this produces a cloud of points. And it means 3D model of territory. But, this work takes a long time: in depending on a quality of photography, a number of photographies and a terrain size it takes from several minutes to several hours.

Most photographic rectification is performed in order to produce rectified aerial photographs which have been brought to some uniform scale in order to produce high-quality mosaics. Photographic rectification is used also to produce scaled photomaps of fiat-laying terrain in lieu of producing more expensive orthophotographs and orthophoto mosaics. In both of these applications, a continuous tone picture of the ground is needed.

By using shooted photographies we can construct orthophotomap of terrain. The mean of orthophotomapping is a joining of the several photographies. But, therewith the center of shooting is created by a projection method, the errors are arised therewith the differences of heights of the relief or other terrain objects on the photographies (fig. 4). That is, because of differences of heights the points are projected in false coordinates.

We can avoid these errors by using of 3D model of terrain (fig. 5) or digital model of relief. On the next stage these errors free any photography is joined and then we obtain orthophotomap or orthophotograph [7].

The orthophotomap making is took some time. But at last time, by use (or not use) ready digital models of relief in some softwares it is possible orthophotomap making during a very short time (with a relatively low precision) on the basis of obtained photographies, by-turn, it increases an application availability shooted photographies by drons in combat operations (fig. 5) [2].

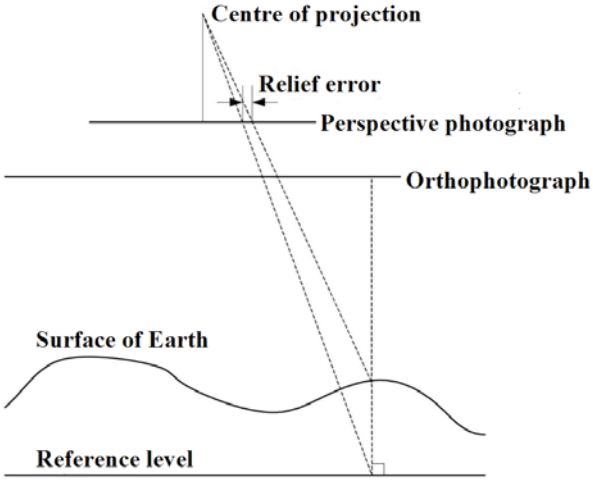

Fig. no. 4. *The error produced by relief effect*

Fig.no. 5. *3D-model of terrain*

4. CONSTRUCTING TERRAIN PROFILE BY GIS TECHNOLOGY

GIS technology is one of the latest modern method to screening condition in digital environment. E.g. Geographical analyze was conducted to study screening condition in GIS environment of a terrain of Azerbaijan by applying ArcGIS 10.3. application of ESRI company [8,9]. 3D Analyse and Spatial Analyse instruments of the program application were used on this purpose.

ArcGIS − ESRI belongs to the U.S. geoinformation program products company. It is applied in cadastral, registraion of real estate, engineering communication systems, geodezy and utilization of

undergroud sources. ArcGIS branded products are classified into table and server products.

Either of key products of a tabletop coordinate measuring machine, ArcView, ArcEditor, ArcInfo combines in itself the functional characteristics of previous product. The key server product - ArcGIS for Server is considered for publication of internet interactiv maps and geoinformation projects which have centralized memory and unlimited vacancies. Imageserver produc is released for publication of big voluminous raster information, ArcSDE is intended for storage of spatial data in UVBS (unificated base system) and for integration with other data systems.

With the help of the mentioned technology, it is possible to select opportune height providing better observation, to determine visible and unvisible area of the very terain, determination of various areas and objectives towards the activity trajectory as well as the pathes the enemy is expected to approach.

It is possible to study observation condition of terrain in a short period of time by means of GIS technology. By ArcGIS application, it is possible to calculate the coordinates of starting and ending points of visible and invisible area along the straight sight (width, longtitude and altitude) and the range from the observation point to a given point, etc.

Line of sight analyze is used by applying 3D analyst module of ArcGIS application. In this analyse geographical analyse is conducted to identify visible and invisible areas wile observing from observation point (A) towards target point (B).

Mountainous area with 2598 meters absolute altitude is selected to conduct geographical analyze. Two points of which approximate altitude is known: observation point (*A*) and target point (*B*) are defined. Absolute altitude of observation point is 2951 meters, the absolute altitude of the target is 2198 meters. Relative altitude of the points comprises 753 meters. Our purpose is to define visible and unvisible areas along the straight line between the observation point (*A*) and the target point (*B*).

The first of all, the classification of relief on altitude model of the area is implemented [10]. A modern sattelite technology is used to design digital altitude model of the area [11,12,13]. It is possible to design inclination and relief exposition maps and 3D models of terrain, to print out terrain profile and analyzes whether we are observable as well as volume analyse by means of digital altitude model (Fig. 6).

With the help of profile given in Fig. 7 the differentiation of the terrain between observation point (*A*) and target point (*B*) as per ranges and altitudes and visible (green line) and invisible (red line) terrains are easily seen.

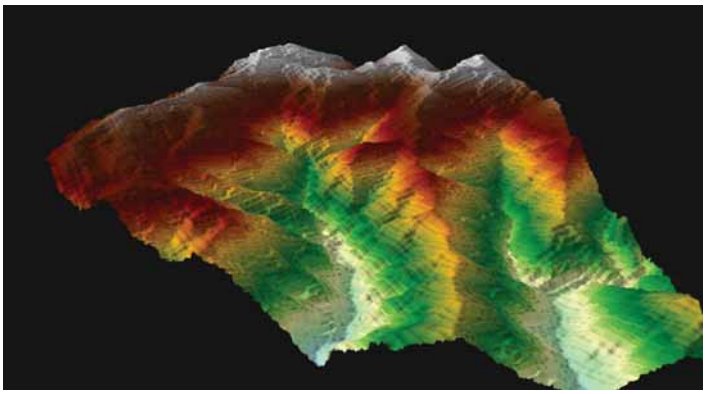

Fig. no. 6. *3D model of prepared relief*

We can have a conclusion from the information we got that the selection for the observation point (*A*) is satisfactory. It gives an opportunity to observe the arrea around point *B*. As it is seen on the template that the terrain of point *B* is totally under control after 3200 meters along the straight line (Fig. 2).

Thus, GIS technology helps in rapid and better understanting of analyze in digital format and in getting precise result close to 100 %. To get more accurate results and to conduct military, strategic planning, the same analyze must be applied from point *B* moving towards point *A*. In this case, screening from enemy positions, it is possible to find out the terrain around point *A* which is under hostile observation and thus military planning tactics could be implemented accordingly.

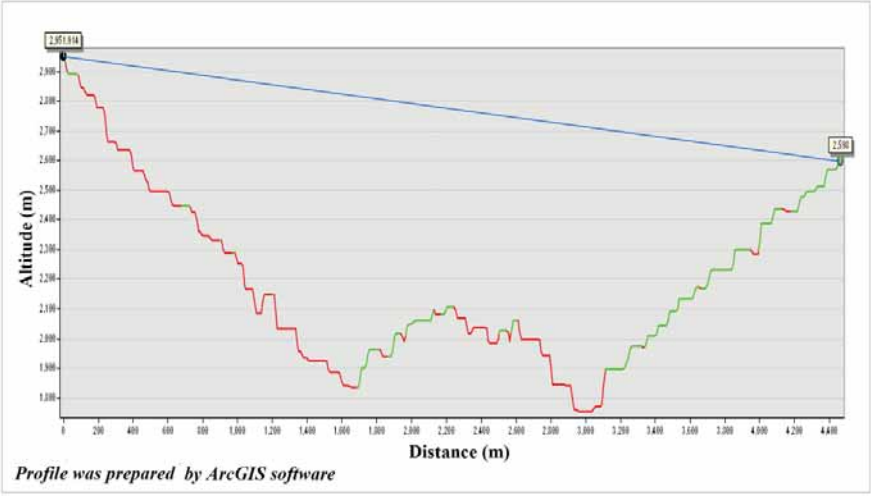

Fig. no. 7. *Altitude profile of visible and unvisible areas along the line between A and B points*

5. CONCLUSIONS

At the conclusion, we can note that for terrain battle reconnaissance the military application of geographic information system and photogrammetry technologies can be implemented if, first of all, photogrammetry specified photographing carry out, shooted photographies in real-time mode are sent by the radio communication to center, an operator implements efficiently the terrain orthophotomap making (determination of coordinates of the sought-for stationary object, efficiently decision making etc.) or constructs the terrain detailed 3D model for orginization in future the battle operations and combat control.

Tthere has been constructed 3D model for choosen mountainous terrain of Azerbaijan Republic using GIS technology. There has been obtained a terrain profile and carried out mapping. Using ArcGis software there has been investigated possibility remain control on obserbvable and unobservable parties of terrain on supervision line from supervision point to target point.

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AUTOMATING THE DATA SECURITY PROCESS

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Contemporary organizations face big data security challenges in the cyber environment due to modern threats and actual business working model which relies heavily on collaboration, data sharing, tool integration, increased mobility, etc. The nowadays data classification and data obfuscation selection processes (encryption, masking or tokenization) suffer because of the human implication in the process. Organizations need to shirk data security domain by classifying information based on its importance, conduct risk assessment plans and use the most cost effective data obfuscation technique. The paper proposes a new model for data protection by using automated machine decision making procedures to classify data and to select the appropriate data obfuscation technique. The proposed system uses natural language processing capabilities to analyze input data and to select the best course of action. The system has capabilities to learn from previous experiences thus improving itself and reducing the risk of wrong data classification.

Key words: *data, obfuscation, encryption, automatization, machine learning, natural language processing.*

1. INTRODUCTION

Modern technological outcomes changed the business environment which now heavily depends on rapid data collection, efficient data manipulation and quick dissemination between involved actors. In many cases technology is deployed as a request for enhancing the organization capabilities to solve a problem without regarding the security of data as a critical capability. Organizations pursue such strategies and do not fully integrate data security in their products because they see security as a systems performance limitation and do not conduct elaborated risk assessment plans to identify the associated impact of data compromising.

Modern organizations have identified the information as being one of the main assets they have

and are building defensive systems to protect it. The classical defensive strategy based on defense in depth poses increased security risks nowadays because of several factors: the need of organization to adopt integrated hardware and software services in order to minimize costs and provide rapid access to information; the need for increased collaboration capabilities due to high mobility requests of modern business model; the increased organization needs to share data with its partners for business advantages; the change of threat actors from script kids to national state actors and the proliferation of advanced persistence threats.

Because of these factors organizations are required to adopt new strategies to protect their data in all of its states: at rest, in use or in motion and apply new models for detecting and mitigating security breaches. Also, because data security imposes constrains to organization business processes and requires investments, sometimes quite considerable and without an evident benefit, organization decision makers are required to conduct extensive risk analysis studies, prioritize the main threats and apply appropriate security measures to ensure the CIA (confidentiality, integrity, availability) data model [1] is preserved while minimizing the costs and the impact on organization business processes.

2. LITERATURE REVIEW

One of the most frequent techniques implemented by modern organization in order to protect sensitive data is the data obfuscation process. The technique is used to alter original data and in this way to hide sensitive data from disclosure. There are multiple data obfuscation techniques but they can be grouped based on data alteration in 3 categories: encryption (all data is affected and the process is reversible), data masking (not all data is affected but the process is irreversible) and tokenization (not all data is affected and the process is reversible).

Data encryption is the process of conducting specific mathematical operations on an original data packet, based on specific cryptographic algorithms, in such a way that the result cannot be deciphered without knowing the secret key. Modern encryption algorithms can be divided in two main categories (symmetric and asymmetric) each of them being used in particular situations based on operational needs and constraints. In both cases one of the most important aspects of encryption is that the function is a bijection [2] and there is an inverse function which provides a way to reconstruct the original message based on a key.

Implementing data encryption in a system comes with great benefits but at the same time comes with

some drawbacks and limitations: requires considerable costs for acquiring dedicated hardware and software capabilities, requires increased resources for system maintenance, increases the difficulty of integrating modern and legacy systems, requires redesigning organization business processes for increased efficiency, high difficulties in providing the technology in large shared environments with increased personnel dynamics, lowers employees efficiency by requiring additional operations, does not provide analytical processes to be conducted on the encrypted data, requires complex key management systems for ensuring encryption key security, prone to malicious insider attacks, etc.

Data masking is another method of providing data security by creating a structurally similar but fake version of a section from a data packet [3]. Many data masking techniques exist today (substitution, shuffling, number and data variance, nulling, deletion, character scrambling, other complex rules) and the selection of which one to be used has to be done based on application integration, business requirements and minimal costs. The main characteristic of data masking technique is that the masked data cannot be converted back to the original data as the data conversion function is not reversible moreover it does not even have to be an injective function.

Data masking techniques is implemented by organizations in processes where operations need to be performed on real data without compromising data security. Such processes need to be performed for many reasons like: testing purposes in research and development environments to increase product's capabilities, enhance user training on special platforms, share data with other internal structures or third party partners in order to conduct data analyses studies to identify customer satisfaction and behavior and ultimately develop better suited products or better marketing strategies, compliance with local or international regulations, etc.

Even if it brings less operational burden on business systems and is best suited in certain environments data masking capabilities have consistent limitations: do not provide recovery of masked data, cannot be used to communicate sensitive data to legitimate applications and humans, does not support authentication mechanisms, cannot be applied to the whole data and selection need to be performed, improper data selection algorithms can lead to accidental exposure, etc.

The third method of data obfuscation is tokenization. Data tokenization is the process of

substituting a sensitive data element within a data packet with a non-sensitive equivalent, referred to as a token, which has no extrinsic or exploitable meaning or value. The token is a reference (identifier) that maps back to the sensitive data through a tokenization system [4]. The system provides capabilities to hide or show sensitive data based on who and what access that user has to information.

In order to provide such services the system keeps a database of tokens called vault linked to the associated sensitive data. Protecting system vault is critical to the system and enhanced procedures need to be in place in order to provide physical security, database integrity, limit access control, provide back-up and restore capabilities, rapid provisioning for peak demands, resiliency, etc.

Implementing tokenization in organizations requires resource investments and even if it solves some problems it comes with certain limitations: if used extensively it generates a rapid database growth, large databases are difficult to maintain and lower systems performance, rely on other obfuscation techniques like encryption to secure the data vault and the communication lines between the data vault and its clients.

None of the data obfuscation techniques is the perfect answer to modern data security challenges organizations face today. Each of the technologies addresses some problems but comes with certain limitations in terms of dedicated investments, required user training, negative influence upon organization business processes performance, allocated resources for system maintenance, etc. In order to protect sensitive data organizations can choose from different alternatives but they need to base their decision on multiple criteria: organizational challenges, technological capabilities, integration efforts within the business, cost of ownership and select the most suitable techniques or a combination of them

Because of the limitations and requirements obfuscation technologies have modern organizations need to conduct a risk assessment plan to minimize data security costs. One of the most important criteria which should guide the efforts is the importance of data for organization.

Organization face today the challenge of being forced to deal with massive amounts of data and trey need to treat data differently based on its importance. Data classification is the process of categorizing data based on some values (importance, domain, location, etc.) [5].

In order to minimize data protection costs in terms of

financial expenditures and impact upon internal business processes organizations need to apply different protection standards for different data classified categories.

The classical process used by organizations to perform data classification is conducted by humans which use their experience, knowledge and a reference system to classify information. After classification they apply an approved system/procedure to manipulate it. This process has considerable limitations like:

- Assign to the whole data object the classification level of the highest classified data packet contained and thus making the whole data unavailable to other systems who need only low level classified information (marketing, research and development, testing environment, etc.);

- Incorrect data classification due to operator inexperience, limited time, high quantity of data or usage of the "better to be safe than sorry" principle;

- Unjustified growth of high level classified data objects;

- Unjustified increase of organizational expenditures for processing higher level classified data;

- Limited flexibility and operational status;

- Increased the impact of data obfuscation upon organizational business processes due to difficulties of integrating different categories of classified systems;

- Increased reaction time of the organization;

- Limits human performance by requesting them to perform side activities;

- Increases operational burden of IT systems maintenance, back-up and data restoration processes.

3. PROPOSAL

This paper proposes a new framework to deal with sensitive data by using the automated machine decision making technology to analyze input data, classify it and then select the appropriate course of action for manipulating it in a secure way. By minimizing the human factor involvement in the whole process the system will benefit in terms of decreasing time reaction, limiting data classification errors, minimizing unjustified organization costs with data protection, increased application integration, etc.

The proposed system mimics human behavior when dealing with a task: observation, comparison to a baseline, create hypothesis, evaluate hypothesis, make decision and finally update knowledge database with special elements encountered. The system consists of 3 main modules:

data analysis, *data learning* (fig. 1) and *data obfuscation* (fig. 2).

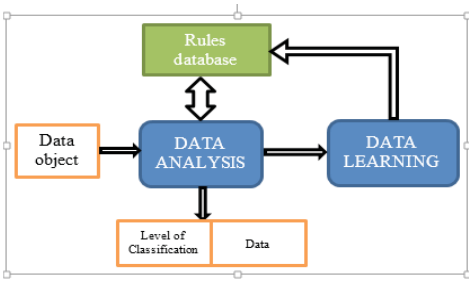

Fig. no. 1. Data analzsis and data learning modules

The systems input will be a data object which needs to be analyzed while the system output will be a data secure object. Depending on the decisions and operations performed by the system the result could be a data object which is encrypted, tokenized, masked or unaltered.

The proposed system has capabilities to analyze input data, create hypothesis based on a rules database, establish the classification level of the information contained by the data object and then apply an algorithm for securing it.

The initial data object consists of information (text, image, audio or video) and associated metadata (who sent the message, who is the recipient, on what communication channel it arrived, what is the quality of the sender and receiver, other miscellaneous indicators).

The first module is the data analysis module. It uses natural language processing algorithms to parse input data objects and decide which level of classification should be allocated to the data.

In order to make decisions the system has a rules database and a data learning module. The rules database consists of an established indicators database composed of specific markers and their corresponding classification level (security numbers, names, financial info, mission info, patterns, etc). The first step is to initialize the database with a baseline indicators pool. For this step a specialized team will develop a list of data manipulated within a specific organization, assign the corresponding classification level and input it in the system. The data learning module (Fig.2) has capabilities to improve the database by adding/removing indicators from the database by using machine-learning algorithms.

The next module (Fig. 2) will process the data and obfuscate it based on the level of classification specified and the implemented obfuscation algorithms. The system has dedicated modules based on organization policies regarding protecting data. The core elements are modules for encryption, tokenization or masking but additional instruments can be established like: provisioning virtual machines to alter data in a secure environment, establish secure

communication links with data storage equipment, configuring data access control, etc.

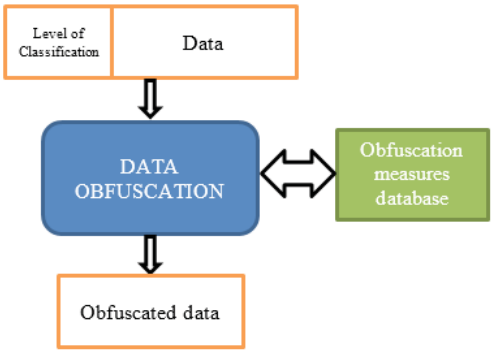

Fig. no. 2. Data analysis and learning modules

The obfuscation measures database is a modularized one and permits updating and modification based on changes appeared in the organization security policy.

The proposed system will be delivered in organization as an application, a service or it can be integrated as a security layer by developing specific APIs. Including such requirements from the design phase of the product will provide flexibility and endurance and will ensure easy integration within the existing IT infrastructure with a minimal negative impact upon organization business processes.

4. IMPLEMENTATION AND TESTING

The proposed system was tested in a cloud environment using the Natural Language Processing (NLP) capability of the Watson computing system offered on IBM Bluemix platform. The NLP is an area from the artificial intelligence domain, highly integrated with computer linguistics and artificial intelligence, aiming to develop a way by which computers can understand the human language. This technology can be applied to organize and structure knowledge, to perform operations like automatic summarization, translation, recognize entities, extract relations, detect patterns, analyze sentiments, recognize speech, etc.

In the conducted experiment an organization was imagined which needed to process data from three classification categories. The proposed system can automatically classify any input data object to one of those three categories without human intervention. The system is able to learn from encountered experiences but in order for it to update its database with new information it requires human validation.

In the first phase three classes were defined (Fig. 3). These classes corresponded to the three data classification categories the hypothetical organization has to manage.

Fig. no. 3. Class definition

Then the system was initialized by building an initial database with "experience". The process consisted of identifying a comprehensive set of words/sentences which could reflect as much as possible the information processed within that organization and then classifying that information based on the three classes created before (Fig. 4). This part is a critical one for the whole process as based on the defined "experience" the system will perform its classification process. The database needs to address the following aspects:

- to correctly define the organization activity as same data could belong to different categories in different organizations;
- to be as comprehensive as possible in order for the system to have an increased reliability. Even if the system has a built-in learning procedure and is learning from previous experiences it requires each human validation. By establishing an initial comprehensive database the validation time can be minimized, classification errors limited and an overall increased operational status;
- to eliminate duplication, one piece of information can belong only to one classification categories.

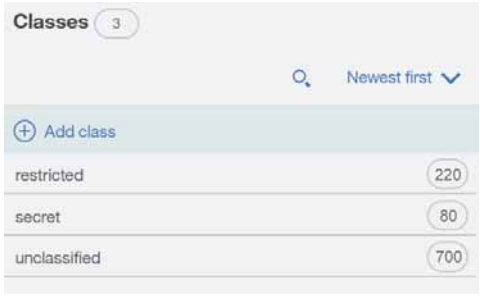

Fig. no. 4. Class population

The next step was to test the system by requesting him to classify an input data object. Multiple data objects from different categories were selected and submitted for analysis to the system (Fig 5) and (Fig 6).

Fig no. 5. Data classification process

The system performed the data classification and returned back the classification category with an error. For the samples from (Fig. 5) for which the system already had a previous "experience" it returned the answer with an error of 0.1 and 0.2 but for the sample from Fig 6, for which the system was not previously trained, it returned an error of 0.35. This output reflects the importance of the "experience" building phase of the system.

Fig. no. 6. Data classification output

The next step was to retrain the system on the unknown data object by assigning it to the classification category specific to the organization. Performing a new classification request returned the following results (Fig. 7):

Fig. no.7. Retrained data classifier

After conducting the classification the data object will be delivered to the obfuscation module where it will be processed based on the established policies and determined classification. Implementing such a module will use standard algorithms for encryption, tokenization or masking.

5. CONCLUSIONS

The proposed model has the following advantages:

- Decreased data classification process time;
- Reduced number of errors within the classification process;
- Increased reliability of the data classification process;
- Increased effectiveness of the data manipulation process within the organization;
- Increased efficiency of the organization human resource by concentrating it on value added activities and releasing from the burden of conducting administrative tasks;
- Increased organizational sharing and collaborative capabilities;
- Rapid adaptability to change;
- Minimized investments in technology by eliminating duplication of resources due to classification reasons - a system can manipulate securely multiple level classified data;
- Minimal operational surveillance after initial release effort the system.

Modern IT environments deal constantly with large quantities of data which humans are unable to process efficiently. The proposed system takes advantage of the technological developments in the natural language processing and minimizes the human intervention in the process. Moreover by taking into considering that the product will be delivered as a service from the designing phase it would have a maximized effectiveness.

Traditional IT security has concentrated on designing secure systems to process raw data rather than securing the actual data. However the cloud computing services combined with the requirements for increased mobility and data exchange has proven this model to be inadequate. Organizations need to ensure that data is processed efficiently and safely, even in untrusted environments, with minimal impact upon organization budget or business processes.

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THE UNITED RESCUE SYSTEM IN BULGARIA. CURRENT RESOURCE RELATED ISSUES AND PROSPECTIVE SOLUTIONS

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The article presents some problems related to securing the Bulgarian system for disaster management with the necessary resources for its proper functioning. The main challenges for the united rescue system in the country are analyzed, including those related to ensuring the system with the necessary material, financial and human resources. Some possibilities for solving these problems with the use of funds from the European Union are presented.

Key words: *resources, disaster management, united rescue system, Bulgaria.*

1. INTRODUCTION

The scale of the devastation, caused by natural and man-made disasters in the Republic of Bulgaria in the last decades shows the necessity for mobilizing a great deal of public resources for decreasing the risk of disasters and for managing their consequences when they inevitably occur. This is the reason why it is necessary to unite the efforts of all public institutions and organizations in a united rescue system for civil protection and disaster management.

2. STRUCTURE AND FUNCTION OF THE UNITED RESCUE SYSTEM IN THE REPUBLIC OF BULGARIA

The united rescue system in the Republic of Bulgaria includes different public and privately owned organizations that have legal obligations to perform different activities related to civil protection and disaster management. In accordance with the Bulgarian Disaster protection act the system includes structures of:

- ministries and institutions;
- municipalities;
- partnerships and individual proprietors;
- emergency medical aid centers and other medical facilities;
- non-profit organizations, including volunteer units for disaster protection;
- the armed forces.

The main elements of the united rescue system in the country are the Directorate General "Fire safety and protection of the population" (directorate of the Ministry of Interior), the regional directorates

of the Ministry of Interior, the Bulgarian red cross organization and the emergency medical aid centers. They are meant to ensure continuous preparedness for receiving information in case of a disaster, its evaluation and immediate action.

For this purpose their structure is built on the territory of the whole country corresponding with its administrative and territorial division.

In case additional resources are needed other elements of the system get involved in accordance with the disaster protection plans.

The units, offices and other operating structures of the system keep their institutional and organizational affiliation and their functions and tasks. In case there is a risk of a disaster or if a disaster occurs they all have responsibilities for disaster management in accordance with their specific competences. These responsibilities include [2]:

1. early warning;
2. urgent measures for decreasing the influence of disasters;
3. informing the population and the corresponding authorities;
4. rescue operations;
5. first medical aid in cases of emergency;
6. first psychological assistance both to people injured in the event of a disaster and to those who take part in the rescue operations;
7. managing the consequences of ecological incidents;
8. protection in cases of explosions and use of ammunitions;
9. search and rescue operations;
10. CBRN protection in cases of accidents involving hazardous substances and materials and in case chemical, biological or nuclear weapons are used;
11. extinguishing fires;
12. evacuation and hiding the endangered population and giving them personal protective equipment;
13. performing emergency reconstruction;
14. limiting the spread and eradication of emerging epidemic outbreaks, epidemics and epizootics of infectious and parasitic diseases;
15. other operations, related to civil protection.

3. PROBLEMS RELATED TO ENSURING THE UNITED RESCUE SYSTEM WITH THE NECESSARY RESOURCES

Ensuring a country's disaster management system with the necessary resources that are for its proper functioning is one of the main problems that need to be addressed. It has been especially serious in Bulgaria in the last two decades due to the constant changes in the priorities of the government policies and the negative tendency in the development of the Bulgarian economy. It is necessary to point out that such problems exist practically

in all structures that are part of the system and concern all the main kinds of resources that are necessary for protection of the population in cases of disaster, that is human, material and financial resources.

One of the main problems for ensuring the united rescue system with the necessary resources is related to securing the required material resources.

The analysis made in 2012 of the state of the system and its necessities of different kinds of resources found that the current state of the machines and the availability of material resources for fire extinguishing and personal protective equipment are insufficient. This leads to the fact that the Directorate General "Fire safety and protection of the population" is practically incapable of performing its main tasks related to protection of the population. The problems related to securing the necessary material resources are in fact so severe that, according to the opinion of the experts, they could not be resolved if based only on the professionalism of the employees [5].

The situation in the system, providing urgent medical assistance, is similar to that in the Directorate General "Fire safety and protection of the population". As of 2014 the analysis of the state of this system shows that the state of the infrastructure and the degree to which the necessities of the emergency medical aid centers are provided for with regard to specialized transport vehicles and medical equipment does not meet neither the requirements for quality and safety of the medical service, nor those for ensuring the safety of work for the medical personnel. In addition to this, some of the urgent medical cabinets in hospitals do not meet the requirements of the medical standard for provision of urgent medical aid with regard to the working area, location and medical equipment [1].

Additional problem that affects the system is related to the amortization of the material resources, including the medical equipment in use.

Another difficulty for the proper functioning of the system for urgent medical aid arises from the different degree to which the medical aid centers are equipped with the necessary material resources. This leads to unequal access of the population to urgent medical aid.

The second main problem of the united rescue system with regard to ensuring all necessary resources is related to securing the human resources required for is proper functioning.

The Republic of Bulgaria holds one of the last places in Europe with regard to the average number of volunteers and professional firefighters per 1000 people in the

country (according to a survey, made by the International association of firefighting and rescue services in 2012). The difference between the values for Bulgaria and for the leading countries in this area is significant (in Bulgaria there are less than 1 per 1000 people, whereas in Austria and Slovenia the figures are more than 30 times higher – 30 and 32,74 per 1 000 respectively) [6].

Significant difficulties exist with regard to ensuring the system for protection of the population within the Ministry of interior with the necessary human resources.

The personnel of the Directorate General "Fire safety and protection of the population" is 8 048 people. This number includes not only experts in the field of civil protection, but also people engaged with activities related to limiting and extinguishing fires, fire prevention and control. The constant reorganization of the system has a negative effect on the motivation of the human resources, engaged it. The limited financial resources for implementing the public policy in the area have similar effect on people's motivation.

In the system for urgent medical aid the situation with regard to human resources is similar. Problems concern not only securing the necessary personnel, but also ensuring its allocation in all regions of the country in accordance with the necessities of the population.

The number of employees, working in the system can reach up to 7111. On this basis 352 mobile and 167 hospital units can be formed. As part of the total number of mobile units – 75 should be specialized in performing cardiopulmonary resuscitation, 127 – should be medical units, 125 – paramedical units and 30 – transport units. As of 01.01.2014 only 6 380 people work in the emergency medical aid centers (1457 of them are doctors and 2652 medical auxiliaries and other medical personnel) [1]. In reality the vacancies are more than 10 %, which shows how severe the problems related to securing the system with the required personnel actually are.

A significant problem for the urgent medical aid system is related to the age structure of its human resources. This structure reveals some extremely negative trends related to the constant increase of the personnel aged 55 – 65. Currently every fourth person working in the system is in this age group. In the meantime only 8 % of the medical experts are in the age group below 35 [1]. In the nearest future this may increase the shortage of medical staff and worsen the access of the Bulgarian population to urgent medical care.

The third problem related to securing the necessary resources for the proper functioning of the united rescue system in Bulgaria concerns the ensuring of the necessary financial resources.

The greatest part of the financing for the system comes from the public sector. It has two main instruments for this purpose – the state budget and the independent budgets of the municipalities.

The constant changes in the priorities of the government's policies as well as the structure and the development of the economy have had a negative effect on the financing provided for the system for protection. The public financing for the system is limited (*fig. 1*), and as a result of this – the possibilities for development and modernization of the structures that carry out the defense significantly decrease [5].

Financing the activities of the state for protecting the population in cases of disasters is ensured mostly through the budget of the Ministry of interior. The reason for this is that since 2009 the main structure responsible for these activities (the "Fire safety and protection of the population" Directorate General) has been a part of this ministry. Additional financial resources are available through the budgets of the municipalities in the country, as well as through the reserve for contingent and/or urgent expenditure of the state budget (in particular that part of the reserve for prevention and consequence management of disasters).

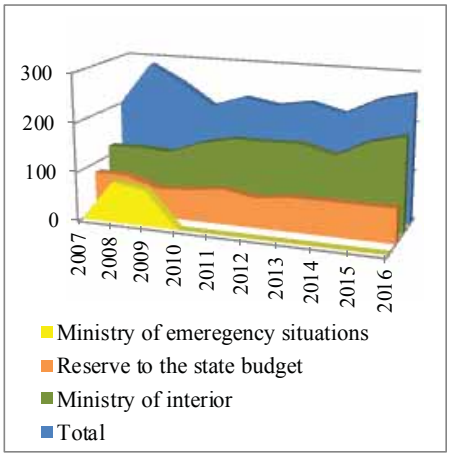

Fig. no. 1. Expenses for fire safety and protection of the population in cases of disasters ('000 BGN)

It is evident from *fig. 1* that the budget of the public sector in this area has not changed significantly in the last 10 years. But as it was pointed out above many new problems, concerning the lack of resources for civil protection and disaster management have been registered since. These facts decrease the possibilities for ensuring the resources that are necessary for the functioning of the united rescue system.

4. POSSIBILITIES FOR RESOLVING THE PROBLEMS RELATED TO SECURING THE BULGARIAN UNITED RESCUE SYSTE WITH RESOURCES

Given that the public budget for disaster protection is likely to remain unchanged, the main possibility for

overcoming the negative tendency toward decreasing the availability of resources for the united rescue system comes from the funds of the European Union.

As a full member of the union, the Republic of Bulgaria has access to all its funds that can be used to finance the national policies in the field of civil protection and disaster management.

The European Agricultural Fund for Rural Development provides opportunities for financing different projects both for prevention of disasters and for reconstruction of sites affected by disasters. The national *Programme for the development of the rural areas 2014 – 2020* gives the country the opportunity to use financial resources from this fund in order to complete the following activities [4]:

- creating, improving and supporting anti-fire infrastructure;
- purchasing equipment for fire extinguishing and personal protection equipment;
- construction or modernization of helicopter pads;
- construction or modernization of water sources that can be used for firefighting;
- construction or modernization of surveillance posts that can be used for facilitating firefighting;
- purchasing communication and surveillance equipment for monitoring forest fires, pests and diseases;
- building and improving forester roads.

For the purpose of financing projects related to civil protection and disaster management the **Cohesion fund** and the **European Regional Development Fund** can be used through the national *programme "Environment" 2014 – 2020 [3].* Financial resources from these funds can be used for:

- the construction of a National center for real time management of water resources;
- realization of measures for prevention and risk management of floods, with a focus on stabilizing costs in inhabited areas;
- research and evaluation in relation to the second Plan for managing the risk of floods for the 2022 - 2027 period;
- realization of demo or pilot projects, related to prevention and management of the risk of floods.

Measures, financed by the programme aiming to increase prevention and managing the risk of floods, include:

- reconstruction of flood zones;
- improving the containment of water;
- biological reinforcement of banks;
- prevention of risks in the inhabited areas – for example designing

and construction/reinforcement/ rehabilitation/elimination of defence infrastructure and/or hydro-technical equipment.

It is necessary to point out that, apart from projects for protecting the population from risks of floods, the "Environment" programme can finance projects related to the defence of the population at risk from landslides.

5. CONCLUSIONS

There are a number of significant problems related to the securing of the united rescue system in the Republic of Bulgaria with the necessary resources, which impede the normal functioning of the system. It is necessary to take them up immediately in order to restore the proper functioning on the system.

In the short term the funds of the European Union present the main possibility to overcome the chronic deficit of resources in the system. These funds can be used not only to finance the prevention activities that can lead to the decrease of the risk of disasters, but also to finance the purchase of different material resources for protection and for the follow-up reconstruction in the event that a disaster took place.

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THE EVOLUTION OF THE MAIN MILITARY STATISTICAL INDICATORS IN ROMANIA (2004-2015)

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In this paper we analyzed the evolution of the main military statistical indicators in Romania from 2004 until 2015 as provided by the World Bank: Armed forces personnel (total), Armed forces personnel (% of total labor force), Military expenditure (% of central government expenditure), Military expenditure (% of GDP), Military expenditure (current LCU).

Key words: *dynamic indices, changing rates of dynamic rhythms, average of dynamic indices, average rhythm of changing, increase, decrease, armed forces, military expenditure.*

1. INTRODUCTION

Romania is a NATO member country since 2004. That is why we considered important to analyze some of the data concerning military expenditure and armed forces personnel from that year until the last available data, in 2015.

We have chosen 6 statistical indicators: Armed forces personnel (total), Armed forces personnel (% of total labor force), Military expenditure (% of central government expenditure), Military expenditure (% of GDP), Military expenditure (current LCU) and GDP (current LCU). (1)

2. METHODS

For the analysis of the data we used the relative and average indicators of time series. First we calculated the dynamic indices with fixed base

$$i_{t/1\%} = \frac{y_t}{y_1} \cdot 100 \qquad (1)$$

and the dynamic indices with chain base

$$i_{t/t-1\%} = \frac{y_t}{y_{t-1}} \cdot 100 \qquad (2)$$

Second we calculated the changing rates of dynamic rhythms with fixed base

$$r_{t/1\%} = (i_{t/1} - 1) \cdot 100 \qquad (3)$$

and the changing rates of dynamic rhythms with chain base.

$$r_{t/t-1\%} = (i_{t/t-1} - 1) \cdot 100 \qquad (4).$$

Third, we calculated the average of dynamic indices

$$= \sqrt[n-1]{\prod_{t=2}^{n} i_{t/t-1}} = \sqrt[n-1]{i_{n/}} \qquad (5)$$

and the average rhythm of changing

$$\bar{r}_{\%} = \bar{i}_{\%} - 100 \qquad (6)$$

3. RESULTS AND DISCUSSION

The first indicator that we analyzed was Armed forces personnel as percent of total labor force. As you can see in **Table 1**. Compared with the percent from 2004, this indicator was always decreased, with the exception of the percent from 2005. If we compare the percent from the year analyzed with the one from the previous year, the situation fluctuates, meaning the percent increases and then decreases.

Table 1. Dynamic indices of Armed forces personnel (% of total labor force) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Armed forces personnel (% of total labor force)	1.746	1.812	1.551	1.563	1.596	1.605	1.637	1.635	1.628	1.634	1.606	1.608
$i_{t/1\%}$		103.736	88.797	89.478	91.401	91.890	93.719	93.621	93.235	93.539	91.948	92.065
$i_{t/t-1\%}$		103.736	85.598	100.767	102.150	100.535	101.990	99.895	99.588	100.326	98.300	100.127

In **Table 2** we can see the exact percentages of increase or decrease. For example, in the year 2005 compared with the year 2004, the percent of Armed forces personnel increased with 3.736%. In the year 2006 compared with the year 2004, the percent of Armed forces personnel decreased with 11.203%. The biggest decrease was in 2006 compared with 2005 – 14.402%. The biggest increase was in 2010 compared with 2009, but it was only for 1.990%, an insignificant percent in reality. The general trend from 2005 until 2015 was one of decrease.

Table 2. Changing rates of dynamic rhythms of Armed forces personnel (% of total labor force) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Armed forces personnel (% of total labor force)	1.746	1.812	1.551	1.563	1.596	1.605	1.637	1.635	1.628	1.634	1.606	1.608
$r_{t/1\%}$		3.736	-11.203	-10.522	-8.599	-8.110	-6.281	-6.379	-6.765	-6.461	-8.052	-7.935
$r_{t/t-1\%}$		3.736	-14.402	0.767	2.150	0.535	1.990	-0.105	-0.412	0.326	-1.700	0.127

In **Table 3** and in **Table 4** we analyzed the Military expenditure as percent of GDP. This time, for all the years from 2005 until 2015 the trend was one of decrease, with the biggest fluctuation in 2010 (-38.146) and 2012 (-38.984%), compared with the data from 2004.

Also for the comparison with the previous year, we can observe the constant decrease of Military expenditure from 2004 until 2010. And then in 2011, 2013, 2014 and 2015 we can see a minor increase, the biggest one from 2014 to 2015 was of 7.747%.

Table 3. Dynamic indices of Military expenditure (% of GDP) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Military expenditure (% of GDP)	2.008	1.982	1.823	1.520	1.441	1.329	1.242	1.284	1.225	1.280	1.349	1.454
$i_{t/1\%}$		98.719	90.781	75.718	71.786	66.200	61.854	63.950	61.016	63.774	67.200	72.406
$i_{t/t-1\%}$		98.719	91.959	83.408	94.807	92.218	93.435	103.389	95.412	104.520	105.372	107.747

Table 4. Changing rates of dynamic rhythms of Military expenditure (% of GDP) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Military expenditure (% of GDP)	2.008	1.982	1.823	1.520	1.441	1.329	1.242	1.284	1.225	1.280	1.349	1.454
$r_{t/1\%}$		-1.281	-9.219	-24.282	-28.214	-33.800	-38.146	-36.050	-38.984	-36.226	-32.800	-27.594
$r_{t/t-1\%}$		-1.281	-8.041	-16.592	-5.193	-7.782	-6.565	3.389	-4.588	4.520	5.372	7.747

In **Tables 5** and **6** we analyzed the Military expenditure as percent of central government expenditure. Compared with the year 2004 until 2015 we can see a constant decrease from 1.518% in 2005 to 31.247% in 2015, the biggest one being in 2010 – 45.263%.

Compared with the previous year, we can see the biggest increase from 2012 to 2013 of 10.808%, and also small increases from 2013 to 2014 (4.356%) and from 2014 to 2015 (4.913%).

Table 5. Dynamic indices of Military expenditure (% of central government expenditure) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Military expenditure (% of central government expenditure)	6.457	6.359	5.783	4.489	4.315	3.669	3.534	3.678	3.659	4.055	4.232	4.439
$i_{t/1\%}$		98.482	89.565	69.516	66.820	56.816	54.737	56.957	56.673	62.798	65.533	68.753
$i_{t/t-1\%}$		98.482	90.946	77.615	96.121	85.029	96.340	104.057	99.502	110.808	104.356	104.913

Table 6. Changing rates of dynamic rhythms of Military expenditure (% of central government expenditure) in Romania

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Military expenditure (% of central government expenditure)	6.457	6.359	5.783	4.489	4.315	3.669	3.534	3.678	3.659	4.055	4.232	4.439
$r_{t/1\%}$		-1.518	-10.435	-30.484	-33.180	-43.184	-45.263	-43.043	-43.327	-37.202	-34.467	-31.247
$r_{t/t-1\%}$		-1.518	-9.054	-22.385	-3.879	-14.971	-3.660	4.057	-0.498	10.808	4.356	4.913

For the rest of the selected indicators – Armed forces personnel (total), Military expenditure (current LCU) and GDP (current LCU) we made a graphical analysis, as you can see in **Figure no. 1** and **Figure no. 2**.

For the Armed forces personnel we can observe the constant decrease, especially the abrupt one from 2005 to 2006, from 177000 persons to 154000 persons.

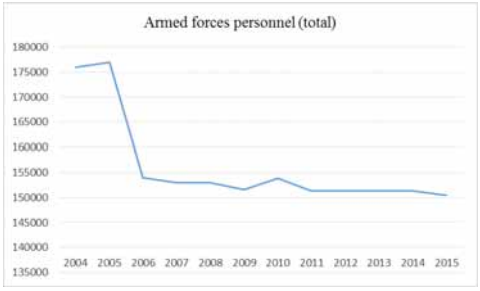

Fig. no. 1. Evolution of Armed forces personnel (total) in Romania between 2004 – 2015

For the Military expenditure we can observe a general increase, with only 2 decreases, from 2008 to 2009 and from 2009 to 2010. For the GDP we can also observe a general increase, with only one decrease of values, from 2008 to 2009. See the comparison in Figure no. 2 below.

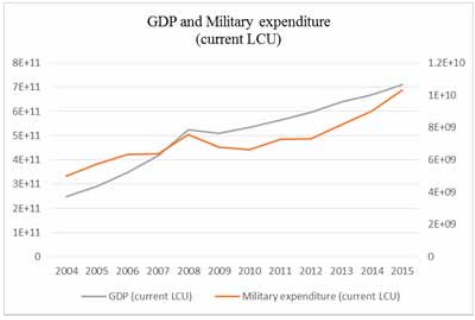

Fig. no. 2. Comparative evolution of GDP (current LCU) and Military expenditure (current LCU) in Romania between 2004 – 2015

For the Military expenditure and GDP the minimum value was in 2004 and the maximum value was in 2015. For the Armed forces personnel the minimum value was registered in 2015 and the maximum value in 2005.

As you can see in **Figure no. 3** and **Figure no. 4**, the statistical connection between the Armed forces personnel and Military expenditure is an indirect connection, meaning the personnel decreased when the expenditure increased. We have the same indirect connection also between Armed forces personnel and GDP.

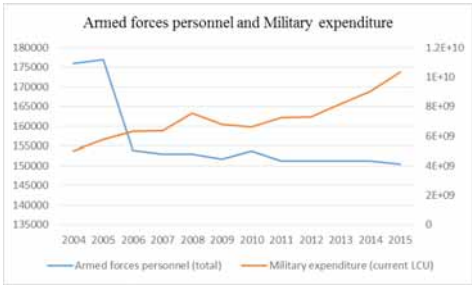

Fig. no. 3. Comparative evolution of Armed forces personnel (total) and Military expenditure (current LCU) in Romania between 2004 – 2015

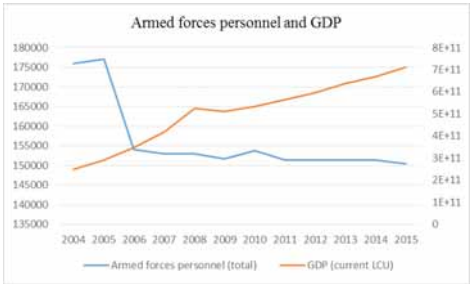

Fig. no. 4. Comparative evolution of Armed forces personnel (total) and GDP (current LCU) in Romania between 2004 – 2015

The indirect connection between the 3 indicators is also reflected by the correlation coefficient, calculated with the formula:

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{[n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2] \cdot [n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2]}}$$

The 2 correlation coefficients are r(AFP,ME) = -0.652 and r(AFP,GDP) = -0.794 showing a medium intensity connection and a strong connection, respectively.

4. CONCLUSIONS

In this paper we have analyzed 6 statistical military indicators in Romania, between 2004 and 2015. The general conclusions are best illustrated by the values of the 2 average indicators of time series: $\bar{i}$ - the average of dynamic indices and $\bar{r}$ - the average rhythm of changing.

Armed forces personnel (total) registered a medium decrease from a year to another of $\bar{i}$ = 0.985 or a $\bar{r}$ = - 1.418%.

Armed forces personnel (% of total labor force) registered a medium decrease from a year to another of $\bar{i}$ = 0.993 or a $\bar{r}$ = - 0.749%.

Military expenditure (% of GDP) registered a medium decrease from a year to another of $\bar{i}$ = 0.971 or a $\bar{r}$ = - 2.893%.

Military expenditure (% of central government expenditure) registered a medium decrease from a year to another of $\bar{i}$ = 0.967 or a $\bar{r}$ = - 3.349%.

Military expenditure (current LCU) registered a medium increase from a year to another of $\bar{i}$ = 1.068 or a $\bar{r}$ = + 6.837%.

GDP (current LCU) registered a medium increase from a year to another of $\bar{i}$ = 1.100 or a $\bar{r}$ = + 10.019%.

In conclusion, even if the GDP and the Military expenditure (current LCU) registered an increase, the Armed forces personnel registered a decrease.

NOTES

(1) LCU – Local Currency Unit

(2) Armed forces personnel are active duty military personnel, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces. Labor force comprises all people who meet the International Labour Organization's definition of the economically active population.

(3) Military expenditures data from SIPRI are derived from the NATO definition, which includes all current and capital expenditures on the armed forces, including peacekeeping forces; defense ministries and other government agencies engaged in defense projects; paramilitary forces, if these are judged to be trained and equipped for military operations; and military space activities. Such expenditures include military and civil personnel, including retirement pensions of military personnel and social services for personnel; operation and maintenance; procurement; military research and development; and military aid (in the military expenditures of the donor country). Excluded are civil defense and current expenditures for previous military activities, such as for veterans' benefits, demobilization, conversion, and destruction of weapons. This definition cannot be applied for all countries, however, since that would require much more detailed information than is available about what is included in military budgets and off-budget military expenditure items. (For example, military budgets might or might not cover civil defense, reserves and auxiliary forces, police and paramilitary forces, dual-purpose forces such as military and civilian police, military grants in kind, pensions for military personnel, and social security contributions paid by one part of government to another.)

(4) GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current local currency.

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ORGANIZATIONAL CULTURE DIMENSIONS AND VARIABLES

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There are numerous definitions of the concept in the specialized literature and the majority present organizational culture as a system of values, norms, rules, beliefs, habits learned and internalized by the organization members and embodied in their behaviors. Such definitions highlight the fact that organizational culture is a system of values, norms, customs and beliefs shared and assimilated by the entire membership of the organization in order to transform them into inherent characteristics of their behavior. The newly acquired behavior will be promoted, defended and developed throughout their work. Even if organizational culture is built upon such a strict, rigid, formal institutional support, it evolves and develops in order to help the organization adapt and perform efficiently. In order to have an easier understanding of the concept, in this paper we shall use for our analysis the following dimensions: cognitive, normative, human and material.

Key words: *culture, dimensions, variables, indicators, strategies, goals, objective, change*

1. INTRODUCTION

Developing a sociological perspective on the size and organizational culture variables requires, first of all, to define the concept of organizational culture and then making it operational which means breaking it down into: dimensions, variables and indicators.

There are numerous definitions of the concept in the specialized literature and the majority present organizational culture as *a system of values, norms, rules, beliefs, habits learned and internalized by the organization members and embodied in their behaviors*. Such definitions highlight the fact that organizational culture is a system of values, norms, customs and beliefs shared and assimilated by the entire membership of the organization in order to transform them into inherent characteristics of their behavior. The newly acquired behavior will be promoted, defended and developed throughout their work.

2. A SOCIOLOGICAL PERSPECTIVE ON ORGANIZATIONAL CULTURE

Organizational culture remains a relatively abstract concept, and to make it more tangible the concept must be broken down into a successive series of elements. In other words, it must be operationalized sociologically, i.e. decomposed into: dimensions, variables, indicators, indices and items [1]. Nonetheless, throughout this paper we consider that deconstructing the concept of organizational culture just into dimensions, variables and indicators will be sufficient.

We suggest to use for our analysis the following dimensions: cognitive, normative, human and material.

The cognitive dimension refers to all information that the members of an organization must assimilate with the purpose to develop and adapt their behavior according to the social model promoted by the organization. The category of elements the members of the organization must learn and internalize first, includes: values, norms, customs, and traditions, beliefs that the organization promotes and defends within and outside its walls. Also, here we can take into consideration both the formal and the informal values, norms, traditions, beliefs promoted by the groups that make up the organization. This is a natural consequence of the fact that every organization, regardless of its domain of activity consists of two structures: the formal and the informal one. Both structures influence the manner in which its members acquire the specific information and translate it into their individual and collective behavior.

This dimension can be ascribed the following variables: values, formal and informal rules of the organization, beliefs, customs, and organizational traditions. Each variable can be decomposed using indicators. Thus, the organizational valuescan be measured using indicators such as: the number of values; the nature of each value, the contents of that value, the degree of the members' awareness of the specific value. The norms are emphasized by indicators such as: the number, the nature of the norm (formal or informal); the members' degree of awareness of the norm.

The normative dimension comprises all the norms and regulations governing the activity of the organization. On the one hand, we can talk about the norms, and regulations existing in the organization which result from laws, government decisions, instructions, orders in the organization. They are binding for all organization members regardless of their status in the organizational hierarchy.

On the other hand, we can talk about rules and regulations, customs, traditions cultivated and transmitted through informal structures of the organization. Obviously, the latter are just as important as for an efficient activity as the official ones, since respecting them is a requirement of each separate group which is part of the organization. Basically, the normative dimension illustrates the system of formal and informal norms governing and formalizing the conduct of the members of the organization inside, as well as outside the organization.

As the variables of this dimension we can mention the following: formal and informal norms, formal and informal regulations. As indicators of the variable we suggest: the number of formal and informal norms, the nature of the norms (i.e. regulating the conduct, the hierarchical relationships, the cooperation among individuals, the activity), the number of the rules which were breached by the organization members; the degree to which the norms and regulations are assimilated by the members of the organization.

The human dimension describes the system skills and abilities that must be met by the individuals performing in the organization in order to become a trusted member, on the one hand. On the other hand, it is about meeting the requirements of the roles derived from the status.

Being a member of an organization signifies *"the position one individual occupies in the organization ... and the set of legitimate expectations from those who occupy other positions within the same system"* [2]. The role assumed by each member represents "the dynamic aspect of status, the implementation of the rights and duties resulting from the social status of the individuals"[3]. We consider that the physical and mental qualities of the human being help him acquire, through learning and education, the knowledge, skills and abilities required by the social status and role assumed.

This dimension, as a whole, defines all the innate qualities and those acquired through learning and education, through which the individual is able to accomplish the requirements of a certain status and to assume its corresponding roles.

As variables of this dimension we chose the following:

1) variables that describe the human individual: general abilities, specific skills, affectivity, intrinsic motivation and extrinsic motivation; memory type, attention characteristics; individual and

collective attitudes; volition characteristics;

2) variables that describe the human group as a structural element of the organization: group cohesion, organizational climate, organizational consensus, organization's effectiveness in reaching its objectives, organizational traditions.

Each of these variables can be assigned indicators. Thus, the abilities variable can be measured using indicators for individual variables such as: the type of aptitude (general or specific); the number of people possessing a certain general ability; the number of people possessing a specific ability required by the organization's field of activity; the proficiency level of the specific ability; the number of people characterized by positive affectivity; the number of people characterized by negative affectivity; the number of people having positive / negative feelings towards the organization; the number of people with intrinsic / extrinsic motivation; the work satisfaction / dissatisfaction; the number of people possessing the memory type required by the organization's line of activity; the number of people having distributive attention; the number of people showing positive / negative attitudes towards the organization and its activities; the number of people possessing strong volition.

As indicators for the group variables we chose: the degree of cohesion; the level of consensus; the type of organizational climate; the effectiveness of group activities; types of traditions; the number of people who share these traditions.

The material dimension comprises all the material resources which are necessary and sufficient for the organization to fulfill the objectives it was created for. We specifically mentioned that the resources should be those required and sufficient for the activity to highlight that both characteristics should be covered by the organization for it to be successful in achieving its goals. There a cases when those who founded the organization could cover only the material resources necessary for the start up without aiming or expecting full achievement of the objectives. The sufficiency of material resources shows that the organization has the capacity to achieve at an optimal level the objectives for which it was created.

The variables of this dimension are: the necessary materials and the sufficient amount of material resources necessary for the optimal functioning of the organization. These two variables can be measured using indicators of the following

type: the degree of provision with the necessary / sufficient resources; the number of necessary / sufficient resources existing in the organization; the amount of resources necessary for the optimal functioning of the organization.

With regard to the operationalization of the concept from a sociological perspective there are absolutely no mandatory rules regarding the number of dimensions to decompose it into. The number of variables as well as the number of indicators assigned to these variables is a consequence of the complexity of the issues addressed, the time available to operationalize a concept, the experience, the imagination, the sociological expertise of the person who undertakes this complex task.

Therefore, the operationalization of the concept is a more creative work than the routine technique applicable ad literam to any topic or scientific endeavor.

3. ORGANIZATIONAL CULTURE VARIABILES

The literature consulted presents a number of variables pertaining to the organizational culture.

According to Coze Annie-Claude & Potin Yvan there are external and internal variables [4].

External variables are those that take into consideration socio-economic factors that explain the organizational phenomena and therefore influence the culture of the organization.

Internal variables are the product of the organization which creates and develops its own values.

Other voices say that any approach to the organization should include and analyze, at least the following variables [5]: structure, strategy, personnel, management style, systems and procedures, guiding concepts, shared values and the skills desired by the organization.

According to Gareth Morgan, *to organize* means to make choices, and an organization cannot be effective unless several elements are compatible: strategy, structure, techniques, commitment needs of its members and the environment [6].

McKinsey argues that together, seven factors determine how an organization functions. These factors include: shared values, strategy, structure, systems, staff, management style and skills [6].

According to John Kotter, the organizational dynamics model comprises seven major elements [6]: main organizational processes, external environment, employees, tangible assets, organizational structure and its components, culture, technology, strategy and objectives.

William Joyce, Nitin Nohra, Bruce Roberson say that the organizations performing very well at their work are very good at four core practices: strategy, execution, culture and structure [7]. To these four we can add: skills and abilities, leadership, innovations, mergers and partnerships.

Kepner Tregoe speaks about variables that influence organizational performance such as [7]:

1. external variables: customers and the customers' clients, suppliers, competitors, management, economy; society and community, the mother company and shareholders;

2. organizational variables: business processes, goals, information management;, organisational structure;

3. human variables: leadership, culture, human abilities;

4. organizational and human variables: strategy; problem management.

Another reference [8] speaks of 7 groups of variables as follows.

The first group of variables refers to the economic, political, legal, social and technological environment;

The second group of variables refers to the organizational management philosophy, its values and directions;

The third group of variables objective covers how the activity is organized. The structure, roles and tasks, work organization, decision making process, human resource management policies and practices and working conditions are the variables of the third component. Organizing the activity constitutes an independent variable that influences the perceptions and attitudes of employees towards their work situation.

The fourth group of variables comprises the perceptions that the employees have towards their work environment. In this case, the perceptions of work are analyzed under three angles: the perception of the tasks, job satisfaction and management perception. In such context, we can mention the following variable characterizing work perception: work overload, work safety, monotony etc. Job satisfaction is analyzed according to the following variables: physical environment, work organization, relations with superiors, salaries, promotion. Management perception is measured by the following variables: care for quality and service, administrative efficiency.

The reaction of the individuals to their working environment is the subject of the fifth group of variables. Here we measure the fundamental organizational behaviors like work motivation, identification with the company's aims and goals career-management, work related stress.

The sixth group of variables refers to the overall performance of the company.

The seventh group of variables includes individual and organizational variables like: age, seniority, function. The analysis also turns towards the intermediate variables or catalysts between the perceptions of work, behavioral reactions and organizational and individual repercussions.

4. CONCLUSION

To conclude, we can say that all these variables describe the organizational culture of an organization and show how it can change and evolve. The variables chosen to describe the organizational culture are determined by what we have in mind when making such an analysis. In our opinion, these variables are not linked to the dimensions of organizational culture. Therefore, we consider that the proposed new sociological perspective is perhaps more complete and can be used when assessing the culture of a specific organization. Since this approach decomposes the concept of organizational culture into successive components - dimensions - variables and indicators that allow for an investigation centered on elements of interest.

Analyzing the phenomenon through in the light of all these theories we can ask the following question: to what extent organizations are able to change? Judging by the institution (formalized, fixed regulation) - organization relation we can say that each is built upon strict, rigid, formal institutional support, characterized by rigid rules and procedures routine, behaviors, we tend to think that the change is either impossible or very difficult to be implemented necessitating time and a mentality restructuration.

However, practice shows that organizations can and must change if they want to maintain a valid place within the social and economic environment.

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AMERICAN EXCEPTIONALISM

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In an interconnected world where foreign relations matter not only for resources or military alliances but also for cultural relationships, it is highly important to have a better understanding of the power relations among nations. The information carries certain meanings that have important outcomes thus defining the power of a given nation. Foreign policy is the channel through which global politics is exercised. International politics is a hierarchy of power being determined by important cultural, economic as well as geographical aspects. The reasons and strategies that are used in order to reach the outcomes in global politics represent the focus of the present paper. The United States has been the leader in international politics since the early 20th century due to its vast resources and wealth as well as its cultural output. America's interest in preserving a democratic and free world has its foundation in the beliefs and values it stands for the aim of this paper is to question whether or not there is a concrete premise for the idea of American exceptionalism.

Key words: *foreign policy, the United States of America, exceptionalism, power, culture, politics, global, relations.*

1. INTRODUCTION

The US foreign policy as far back as the War of 1812 has been about taking measures to protect the economy in order to control and make use of the wealth for further progress. The American history and identity have solid foundations in culture.

The present paper aims at questioning whether or not there is a concrete premise for the idea of American exceptionalism.

2. AMERICAN EXCEPTIONALISM – ETYMOLOGY, ORIGINS AND DEFINITION

American exceptionalism can be perceived as a unified principle common for narratives and ideas in American politics and culture being enrooted in social and traditional history.

2.1. Etymology and origins

The phrase "American exceptionalism" was coined by Stalin, however, the key term "exceptional" referring to the United States dates back in history to Alexis de Tocqueville who described the American people as being different from the European one – an exceptional people with exceptionally enlighted social ideas (Tocqueville, 2010:768). Tocqueville analyzed New England life and

government whereas Stalin probably meant the opposite – Americans are not a deviation from the norm. According to Tocqueville Americans are historically European by origin, harboring European enlighted ideas, but a distinctive way of applying them in the social structure. A unified national awareness of themselves through the guarding of the essence that constitutes their historical, cultural and traditional identity (Tocqueville, 2010:755). Stalin calls it "American exceptionalism".

2.2. Defining the concept of "American exceptionalism"

It is very difficult to cover the whole meaning behind the phrase "American exceptionalism". A diachronic approach is needed as it offers a better understanding by means of the proper context throughout the centuries.

Exceptionalism is a political tool which was used from George Washington to Ronald Regan for both internal and foreign purposes. It is a tool of rhetoric connecting the American people through a shared identity.

John Winthrop is associated with Puritanism and he is considered to be the founder of Massachusetts Bay Colony - one of the first permanent English settlements in America. John Winthrop was the first to convey the general meaning of American exceptionalism in his religious speech defended to his congregation focusing upon their mission being the chosen people of God. Thus, the Puritans established a permanent English settlement on the American soil under theocratic rulership (Schmidt, 2008:284), that is, a settlement ruled by religious leaders. Winthrop ends his sermon with the following words: "For we must consider that we shall be as a city upon a hill. The eyes of all people are upon us" – an image that is characteristic of the American exceptionalism, a model for the others, the predestination of Manifest Destiny and the American Creed (McCrisken, 2003:1).

American exceptionalism is the conviction that the US holds a prominent place among the developed countries in the world for its treasures in Western history standing for the center of enlighted ideas and democracy. America's distinctiveness from the European politics, culture and philosophy confers its power. It is about national identity as Deborah Madsen states. "American exceptionalism permeates every period of American history and is the single most powerful agent in a series of arguments that have been fought down the centuries concerning the identity of America and Americans" (Madsen, 1998:1).

The religious basis for exceptionalism was extrapolated against the Native Americans with the westward movement, the ever expanding frontier. American exceptionalism coincides with the rise of the US as a global power.

3. AMERICAN HARD AND SOFT POWER THROUGH THE LENS OF EXCEPTIONALISM

When talking about global politics we must refer to the issue of power. Foreign policy making is a negotiation of power, a dialogue of giving and taking, it is about relations among nations. Power can be present in many shapes and forms.

The source of power is context dependent for example in the wealth of resources or military strength. Joseph R. Nye on soft power states that "holding a winning poker hand does not help if the game is bridge" (Nye, 2004:3), that is, a given resource is useless if it does not influence the outcome of the play.

Power can have its origins in resources such as, economy and culture, thus, having different goals. He who holds the high card in the right game establishes the different types of relationships.

Hard power may refer to military political maneuvers or financial sanctions on a given country: for instance, in 2003 the Iraq war caused worldwide American popularity. But wars are no longer a feasible solution for foreign policy problems.

Soft power is the product of culture and openness of a given country. Cultural exports such as music, film and television carry the meaning implicitly. Hollywood is present everywhere. It is highly important to know to use the cultural values in order to be able to conduct the home and foreign affairs. Power is subliminal, but effective.

4. THE INFLUENCE OF AMERICAN EXCEPTIONALISM

I suggest a questionnaire consisting of 8 questions about the topic debated in the present paper. It is written in a multi-choice system with three options to choose.

4.1. QUESTIONNAIRE

Here is the questionnaire consisting of 9 questions:

1. Do you think that America has a special destiny in world history?

a) Yes, the United States is qualitatively exceptional as compared to any other nation or empire in history;

b) No, America is not particularly dissimilar when compared to other nations;

c) America is different in comparison to other well developed

nations, however, not necessarily extraordinary.

2. Do you agree with the depiction of rich patriotic imagery and the mythologizing of American history in popular discourse?

a) Yes, it is part of the American identity;

b) No, it is slightly arrogant providing an irrational sense of self pride;

c) Other.

3. Do you think that America is an essential force for good in the world?

a) Yes, ignoring the negative sides, America has a net positive influence on world affairs;

b) No, meddling with foreign affairs is too controversial, as such the negative aspects are much more apparent (think of Iraq or Afghanistan);

c) Other.

4. Did the United States fight a just war in Vietnam or Iraq?

a) To obtain justice, most of the times the military intervention is necessary;

b) Morality cannot be defined by aggressive actions;

c) I do not know.

5. Do you think America should continue to lead the |Free World"?

a) Yes, I think America is well equipped for the job considering its history and principles;

b) No, America should step aside and listen more closely to what the others have to say;

c) Neither, America should focus upon domestic problems.

6. In your opinion, does America owe its power to its cultural or military exports?

a) The US has a large influence abroad in terms of cultural exports, such as: brands, films, music and television;

b) The US carved out its sphere of influence with demonstrating military strength (Mexican-American War, WII, Korea, etc.);

c) Other.

7. Would you say that positive opinion makes American influence abroad stronger?

a) American cultural ubiquity in foreign countries determines the opinion of others through attraction, thus power is established;

b) Influence is gained through resources and policies constructed and applied at home.

c) I do not know.

8. What do you think about the domestic political discourse? Is it a factor to consider when weighing global influence?

a) Yes. Home policies are reflected in foreign policy which, in turn, influences the opinion of the other;

b) No. Home policies are not as visible outside as other facets of

power, such as: brands, films, music (culture). As a result, it is not much of an influential factor.

c) I do not know.

4.2. SUBJECTS OF THE QUESTIONNAIRE

In total there are 106 recorded subjects. The vast majority refers to American nationals standing for 77 respondents representing 73%. 7% are British, 6% are Australians and 8% Canadians. The rest of 6% is represented by various other respondents who identify themselves as Dutch, Pakistani, Chilean, Finnish and German.

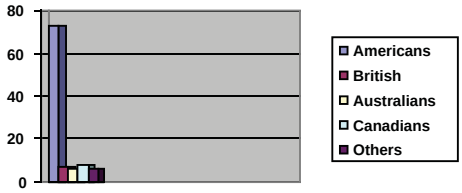

Fig. no. 1. Subjects' Nationality

Under the age group category, 48% fall into the 21-30 range with 51 individuals, followed by the 15-20 category with 27% standing for 29 respondents, closely trailed by the 31-45 age group with 18%, the remaining 7% consisting of 6 people belonging to the 45-59 age group with one person claiming to be above 60 years of age.

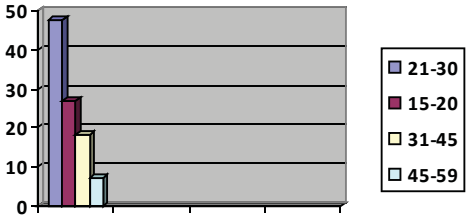

Fig. no. 2. Subjects' Age

Concerning the occupation of the subjects, it is worth to mention that 46% or 49 respondents are still students whereas 54% or 57 have careers in fields such as: IT, engineering, business, education, health, government, retail.

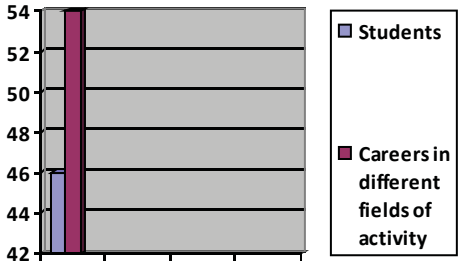

Fig. no. 3. Subjects' Occupation

On the political spectrum, 68% recognize themselves as Left leaning at 72 respondents, 17% Right leaning at 18 individuals and 15 % who claim to be Moderates, Statists and Independent.

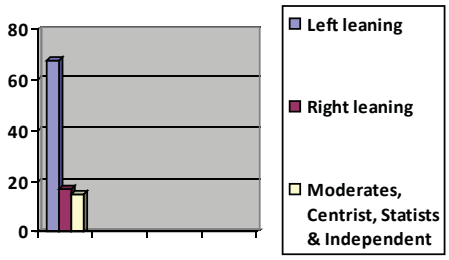

Fig. no. 4. Subjects' Political Spectrum

4.3. THE INTERPRETATION OF THE RESULTS

The first inquiry addressed to the respondents asked whether in their opinion America has a special role in world history. The reason for this question is to see if Reagan's attitude – that of maintaining a deep devotion to the ethos which translated into the public conscience – is still reflected after his first speech as president making reference to Winthrop's sermon. Only 12 respondents think that the United States is qualitatively exceptional as compared to other nations standing for 11% of the total number of respondents. The majority, that is, 61% consider that America is not necessarily extraordinary, however, still intrinsically different. 28% feel that America is not particularly exceptional regarding Reagan's words being the "beacon of hope" (Reagan, 1981).

The second question moves to identify the early US history treated as myths. 66% or 70 respondents agree that it is a slightly arrogant nation which only serves of self pride. Only 23% or 24 respondents disagree considering that it is part of American identity and it should be treated as a source for patriotism The remaining 11% argue that even if it may seem arrogant, it is not different from the other cultures.

The third question refers to America as an essential force for good in the world. 49% of the respondents consider that the United States has had many missteps in the pursuit of such a vision. Only 27% consider that even if these issues were not beneficial in the short run, the long term brought a positive outcome. Most, about 63%, however, think that even though the US is a strong force, it has too many negatives to be the essential force for good in the world. 10% are those who had other opinions: America does both good and bad being left with in a neutral position, the US interests occupied the pole position in the world, the US should not be the world police.

The fourth question "Did the United States fight a just war in Vietnam or Iraq?" 98 respondents representing 92% agree that violence is not the answer to obtaining justice. Only 8% or 8 respondents think that sometimes it is necessary to use force to secure interests.

The next question seeks to find out if the US is well equipped to lead the Free World. 43% responded that

America should listen more rather than do its own thing. 42% consider that America should rather focus on domestic problems. Only 15% agree that the US should continue to lead the democratic world.

The sixth question deals with hard and soft power 22% consider that its power is due to the military strength and 74% of the respondents believe that the nation as a whole has a defining power abroad in the cultural sense. 4% have mixed feelings considering that America's power might have been gained through cultural imperialism brought on by the success of the war campaigns.

The seventh question analyzes whether soft power had been created in the foreign countries rather through cultural attraction than by attracting the home policies practiced at home. 53% or 56 respondents believe that the domestic policies play a very important part in coopting others to like America. 47% or 50 respondents consider a cultural explanation as the best answer to the question.

The eighth question tries to find out if the domestic policies have a direct influence on the foreign policy. 69% of the respondents recognize the importance of the policies exercised at home as having a clear connection with foreign policy and 31% conclude that the cultural discourse has a higher rate of influence abroad.

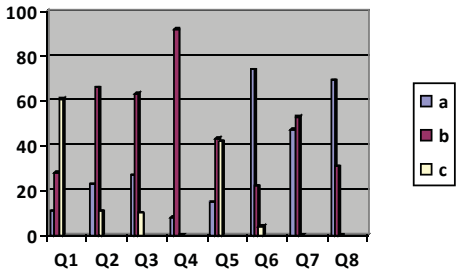

Fig. no. 5. Interpretation of the Results

I avoided surveying the respondents directly on the issue of American exceptionalism. Of course, the idea itself is there within the key words. The first five questions have exceptionalism in mind.

The US is unique in the world history, however, it does not undoubtedly mean that it is also extraordinary. The leading opinion resigns the notion of exceptional.

More respondents believe in pacifism and not in aggression. More subjects think that America should neither lead nor trail when it comes to global politics. However, the United States has a rich influence abroad especially due to its culture.

5. CONCLUSIONS

Foreign policy is correlated with American exceptionalism. Identifying it as an impulse of American identity, exceptionalism plays an important part in the US society.

Even though Tocqueville has defined it in the 19th century, exceptionalism is a dynamic ideology.

The 20th century saw its rise as a way to define American democracy versus Soviet totalitarianism, a clear-cut distinction that was highlighted by the Cold War. Exceptionalism explains why America is exceptional as well as describes the nature of this order.

The questionnaire shows that most Americans do not believe that their country is exceptional. They consider that the historical explanation of American exceptionalism is based on a mythologized depiction of history, upon a romanticized portrayal of history.

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INFLUENCE OF SHIRVANSHAH STATE ON NAVAL AFFAIRS IN AZERBAIJAN

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The historic destinies of Azerbaijan are mostly bound up with the Caspian Sea. Already in XII Century State of Shirvanshah established naval fleet in the Caspian Sea in order to defend country from the sea. The component part of Armed Forces – Fleet took an active part in repulsing attacks to the country from the sea though in X – XII centuries the fleet consisted of several scores of ships. It had been investigated that the most striking trace in the history of Naval Affairs in Azerbaijan was left in 1175 when pirates tried to invade Shirvan from the river Volga. Also conceptions of different historians concerning the first information about the Caspian Sea, as well as the people inhabited the coastal area of this sea appear in this article.

Key words: *defensive system, naval affairs.*

1. INFLUENCE OF SHIRVANSHAH STATE ON NAVAL AFFAIRS IN AZERBAIJAN

During the period of entering of Azerbaijan into Arabic caliphate in the VII and first half of the IX century the Arabs, having blown up Byzantines' trade pathways, turned trade pathways eastward to the Caspian Sea, which in its turn promoted rapid flourishing of cities in by Caspian countries. Arabs took over the whole Caspian-Volga trade way, which till that time was under Byzantine control. The Khazars were defeated by the Arabs and were not representing any serious danger for new trade pathway. All ports on the Caspian Sea were under Arabian surveillance and according to Ibn Haukal "were often visited by merchant ships which sailed from one port to another" [1, t. 1].

With the appearance of independent Azerbaijani feudal states in the IX-X centuries, especially with reinforcement of the Shirvanshah state in the X-XIII centuries, naval affairs in Azerbaijan passed to the new development stage.

It would be worth noting the fact that military organization of Shirvanshah Mazyadids had rather complex structure since

military affairs had centuries-old tradition here and innovations only complemented but did not change the existing military system. The Army consisted of constant troops that were Shirvanshah Guards and armed militiamen, rulers of the areas and large feudals, mobilized in case of war. The Regular army consisted of cavalry and infantries. The troops were under the leadership of "sarlashkar" (Persian) which in peacetime had subordinates like regular troops - "asker" (Arabian) and local "dun" (Arabian), as well as palace guards - "gulams" and engineering units [2, p. 149].

The important component of Shirvanshah armed forces was the fleet consisting of tens of ships, which in the X - XII centuries took active part in the repulse of attacks to the country from the sea. The Azerbaijani fleet strengthened particularly in the XII century during the reign of shirvanshah Ahistan I (1160-1196). In 1175 Ahsitan I defeated the Russian fleet near Baku. He destroyed 73 ships with the support of Georgian tsar George III, and occupied Shabran and Derbent, which had been captured by the kipchaks the day before [3, p. 141].

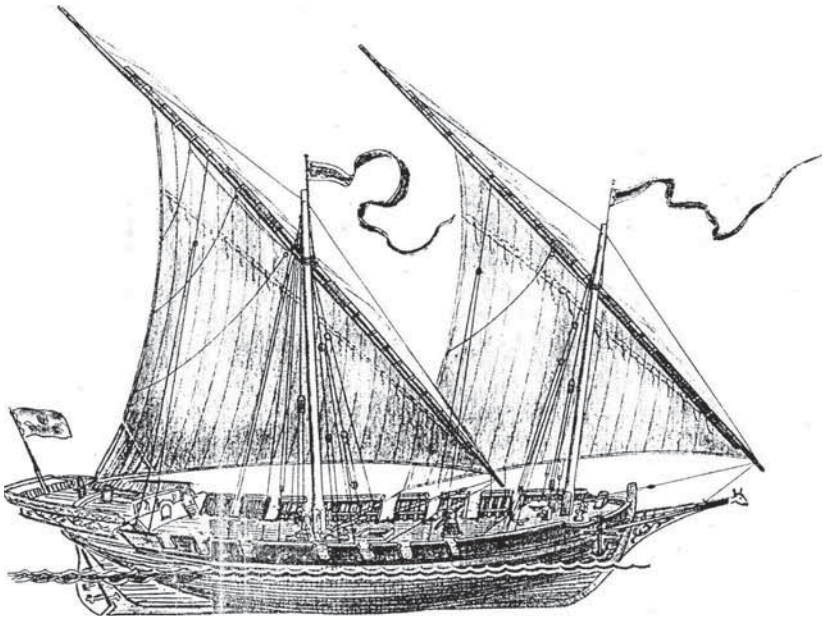


Fig. no. 1. *"Shebeke" – military ship of Shirvanshahlar's state (XII-XIII c) (S. Ahmedov's reconstruction)*

Shirvanshahs paid special attention to the building of military fortifications, especially, for the reason to secure the seaside from the sea attacks. From the X century the role of Baku commenced considerably to increase. Mukaddasi (985 year) wrote that "Baku on the sea – is the only harbor of the area" [4, p. 70]. "Ships also sail on it (i.e. the Caspian - the author) moving between the places which we mention on the south seaside to Baku, where mines (the sources) of white oil and other (minerals) are" – noted another Arabic author al-Masudi in the X century [5, p. 201, 202]. In the result of Shemahi earthquake in 1192, the importance of Baku increased, and aftermath it became the capital of the Shirvanshah state.

Exactly in this period, according to the great Azerbaijani poet of the XII century Khagani, Baku changes into the large port and the center of the international transit trade on the Caspian Sea. As a whole in the XI-XII centuries and later the world trade, linking Azerbaijan with India and China, was realized on the south land pathway through Central Asia to Iran, the south areas of Azerbaijan and on the north road, along the Caspian Sea coast past Derbent passage to the Khazars' country and further. This was the nearest way from Absheron [4, p. 112, 113]. It is noteworthy that the level of the Caspian Sea before the end of the XIII century was low and the seashore was much larger than the present one. During the reign of Shirvanshah Fariburz III (1225-1243) on one of the islands near Baku the Sabail sea fortress was built as a naval installation of Shirvanshah fleet. The road uniting the fortress with the land was consolidated by a long stonewall. Its construction was done under supervision of Azerbaijani architect Zaynaddin Abu Rashid. Having the wrong shape the fortress strongly extended rectangle measuring 180 m to 40 m, had strong walls consolidated by 15 towers. The 4 largest of them had cylindrical form and were set out on the corners of the fortress. One of them - bonjon tower was the largest. The rest 11 intermediate towers had the shape of a semicircle. Their small diameter did not allow to place into each of them more than one or two shots that enabled to lead the fire in only one direction. This defect of the defense was compensated by frequent loopholes and merlons in the walls, which were to provide sufficient density of the fire. The narrow fold between this fortress and the small fortification in the place of the modern ship-repairing plant was closed by chain. However, this fortress as well as the whole coastal part of Baku was flooded together with the connecting wall as the result of a strong earthquake [6, p. 92, 93].

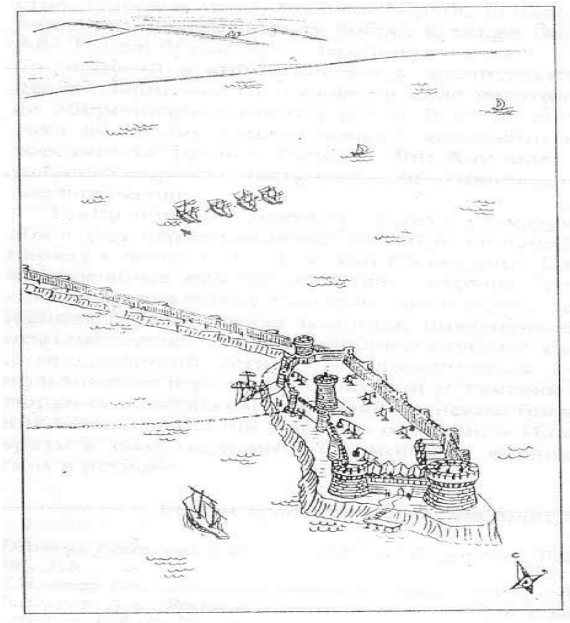


Fig. no. 2. *Military naval fortress of Sabail (XIII c)*
(S.A. Ahmedov's reconstruction)

The first Baku fortress, built on a high hill in the first half of the XII century during the reign of Manuchehr III (1120-1160), had a tower type citadel inside of approximately 20 m height, but outside it had the shape of a tetragon [2, p. 178; 9, p. 128].

The important element in the defensive system of Baku in this period was Giz Galasi (Maiden tower), built according to Azerbaijani scientist: S.B. Ashurbeyli - in the first century B.C., to M.A. Nabieva - in the VI century B.C., but according to the version of the historian of Azerbaijani architecture L. Bretanichki in two stages: the V-VI centuries and the XII century. This powerful building 28 m high and with walls 4-5 m wide was the defensive tower both from the sea and the land [14, p. 151].

The legend about "Caspian Atlantida" is connected with this period. There are evidences of Medieval authors such as Bakuvi, Shirvani, Nadzhaty and others about flooding of several Azerbaijan coastal cities as the result of the sea level rising. Western travelers stated this phenomenon too. So Venetian traveler Marino Sled (1320) had an inscription on his map beside the western Caspian seaside: "Every year sea comes one palm forward and a lot of good cities are flooded" [7]. As far back as in 1844 the

prominent Azerbaijani encyclopedist A.Bakikhanov tried to find the flooded city of Yunan-sheheri ("Greek city") by means of two sailing vessels [7]. By efforts of Azerbaijani archeologist-submariners in 60-70s of last century, both under water and at the seaside, lots of historical monuments were revealed on islands and undersea shoals and even historical area of Shirvan - Gushtasfi of the early XIV century turned out to be under water with its cities and villages, occupying extensive zone in the estuary of the Kura. Archeological monuments - Byandovan I and Byandovan II towns were fixed on ancient riverbeds of the Kura and beside the seaside. Medieval (the XII-XIII centuries) Gushtasfi city localizes with the former, but with the latter - Mugan city (the IX-XII centuries), which possibly were also coastal ports on the Caspian [8]. Undersea researches in water areas of Sangi-Mugan Island (Svinoy) revealed that this island was one of the shelters of the medieval seafarers on the Caspian Sea [9, p. 82, 83]. Another seaport was situated beside Amburan cape (Bilgah village) at the north Absheron seaside, where archeologists discovered under water stone anchors of medieval ships, sailing on the Caspian Sea [8].

The construction of maritime military-fortification buildings in Derbent and Absheron, and first of all in Baku, were dictated by exigency of protection of the seaside from repeated attacks of the Vikings and the Russians**,** which began even since the end of the IX century. Beginning with the IX century it was customary for the Russians to sail on the Caspian Sea. Ibn Hordadbek (the IX century), Ibn Fakih (the X century), Ibn Fadlan (the X century) wrote about this. Ibn Hordadbek in his "The book of routes and states" (840-850) wrote that Slavonic merchants "went to the Dzhurdzhan Sea (i.e. the Caspian) and moored to any coast there" [10, p. 3].

There are two stages in the history of the Russians' marches to the Caspian Sea and to the South Caucasus. During the first one – up to the middle of the X century - they were undertaken for trade and only sometimes they carried military character. But from the middle of the X century Russians sought to settle down firmly in the west by Caspian area.

At the end of the IX century and especially during the X century besides peaceful trade sails, the Russians performed several great military campaigns on the Caspian Sea. Densely populated southwestern Caspian seaside attracted foreign conquerors from time immemorial. Russian merchants who reached the shores of the Caspian Sea on their ships were well aware of the wealth

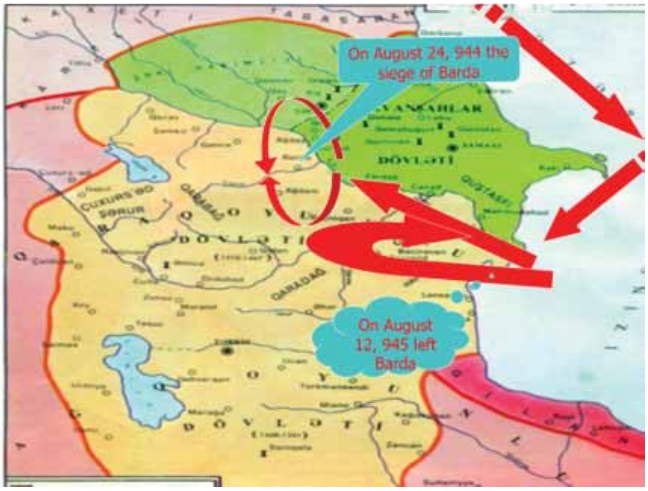
of these areas of Azerbaijan [11, p. 92]. This explains predatory nature of these campaigns.

The first of the great campaigns took place in 880, when the Russians attacked Abeskoon (the island, located in Astrabad gulf near the southern coast of the Caspian Sea), however in struggle with Hasan ibn Zeyd they suffered a defeat [12, p. 36]. In 909 they repeated their raid to Abeskoon, having sailed up here on 16 ships. However, soon they were exiled again. Next year during another raid the Russians were defeated by shirvanshah Ali ibn Haysam's fleet [13, p. 98]. It proves that in this period shirvanshahs already had their fleet on the Caspian Sea. In their turn the Russians had one-wood ships in which rowlocks, oars, masts, yards and sails were installed. During the sails they always tried to keep close to the shores. [13, p. 99].

The greatest Russian campaign of this period took place in 912-913 years. During the campaign the Russians sailed from the estuaries of the Dnepr to the estuaries of the Don via the Black and the Azov Seas. Then they dragged their rooks across the land to the Volga and came down to the Caspian Sea. Their fleet consisted of 500 ships and there were 100 men on each of them. As Masudi noted in his work "the folks living on the coasts of this sea were confused since in former times they had never seen the enemy approaching them by the sea and only merchants' and fishermans' ships were sailing on the sea" [3, p. 76]. In the course of this march, after completion of the attacks on the southern Caspian seaside, the Russians attacked Baku seaside as well, having probably disembarked on Beyuk-Zira Island. Shirvanshah Ali ibn Haysam, having armed his forces, sent them on barges and small trade ships to neighboring Baku islands. However, the Russians, whose ships were of higher quality, managed to split shirvans, while thousands of them were killed and sunk. According to Masudi, the Russians remained on this sea for several months and navigation was stopped due to occupation of the islands near Absheron by the Russians and danger of attacks on trade ships. Having seized rich prey in Absheron, the Russians returned then to Khazar region, to the estuary of the Volga and to the North Caucasus, where they were attacked by Moslems. Though the Khazars did not have any ships, they managed to lure the Russians from

the sea and after three-days battle the Russians suffered a heavy defeat. Only insignificant part of them was able to return to their native land [4, p. 62, 63; 2, p. 160, 161].

The greatest of all the Russians campaigns on the Caspian Sea was in 943-944 and was described by Ibn Moskaveykh ("The book of peoples' ordeals"), by Yakut ("Geographical dictionary"), by Abu-Faradzhi ("Syrian chronicle"), by Abuli-Fedoy ("Moslem chronicle"), by Ibn Al-Asirom ("Full chronicle") and by the great Azerbaijani poet Nizami Gyandzhevi ("Iskendername").



The Russian flotilla**,** having left the estuaries of the Dnepr, sailed to the Don via the Black Sea and the Kerch strait, and then having gone up the river, it was portaged to the Volga and finally sailed to the Caspian Sea. As soon as Russians reached the estuary of the Kura, they went up the river on their vessels to Mubarek village situated not far from Barda, where they moored their fleet. On 24 August 944 they began the siege of Barda. As a result of the assault the Russian forces, vastly exceeding in quantity, occupied Barda [14, p. 11]. It is worth noting the fact that unlike the previous marches, bearing obviously predatory character, this march of the Russians pursued the object of creation in the South Caucasus, on the banks of the Kura with the center in Barda, the analogue of the political formation, which was created by them in Tamana, beside the estuary of the Kuban with the center in Tmutarakani [12, p. 56].

Campaign of Russians to the Caspian Sea, the battle for city Barda, the 943-944s, a painter – N.M. Kochergin, 1948.

However, the Russians did not manage to consolidate in Barda. After several bloody battles with the troops of Marzuban ibn Muhammed from Salarid dynasty, during which the Russians had heavy casualties, and because of the epidemic that began in their camp, the Russians urgently left Barda on 12August 945 [2, p. 163]. The next attempt to penetrate into Barda through the estuary of the Kura the Russians made in 987, when they appeared again on 17 vessels near the estuary of the Kura. However, because of stubborn resistance, shown by local inhabitants, they did not manage to stay here for a long time [2, p. 163, 164].

Several decades later in 1030 the Russians appeared again on the Caspian Sea, having attacked Shirvan on 38 ships. Shirvanshah Manuchehr I (1027-1034) met them with his troops near Baku. In this battle shirvans underwent heavy losses but the Russians went up the Kura and reached the Arax. Shirvanshah tried to stop the advance of the Russians along the river, having dammed the Arax, but unsuccessfully. Nevertheless, stubborn resistance of shirvans prevented their further advancement on the Arax. Meanwhile the ruler of Ganja Sheddadid Musa ibn Fadl hired the Russians and used them for suppression of the rebellion in Beylagan. After this the Russians left the territory of Arran and went to Byzantium. Then they returned to their native land [5, p. 54]. In 1031 the Russians again appeared near Baku,

but this time they were defeated by the ruler of Arran Abulfat Musa ibn Fadl. Moreover, the biggest part of them was annihilated. In 1032 the campaign of Savir, Alan and Russian joint forces against Shirvan took place, however on their way back they were smashed by Derbent emir Mansur. Only a small detachment of the Alans managed to escape [2, p. 164].

It would be worth to accentuate the appearance of the eastern Normans "Varangians" on the Caspian Sea, where they got, sailing on the Baltic Sea - Riga bay – the western Dvina-the Dnepr-the Volga route, penetrating then into the Black Sea and the Caspian Sea [15, t. 14; 16, p. 440-442]. There is a lot of information about Albania and the Caspian (the Girkansk) Sea in ancient scandinavian treatises and the XII-XIV century maps, made on basis of Vikings' practical experience [17, p. 35, 41, 69, 123; 18, p. 36].

The year of 1175 left the brightest trace in the history of naval affairs in Azerbaijan. This year pirates-wanderers from the Volga tried to invade Shirvan. They crossed the Caspian Sea on 73 ships and, having dropped anchor near island Ruinas (Sari), went up the Kura to Lemberana. At the same time, the kipchaks occupied Derbent and, having proceeded to the south, occupied citadel Shabran. However, the kipchaks were soon defeated by allied georgian-shirvanshah troops. On the sea the Azerbaijani fleet, created by efforts of shirvanshah Ahsitan I, defeated the fleet of the strangers. All these events found their poetical reflection in victorious odes of Hagani, devoted to Ahsitan I [1, p. 163; 19, p. 528-530]:

Hakan-and kabir Abu-l-Muzaffer became the first among the conquerors.

His sword got help of the heavens during the conquest of Derbent and Shabran.

Your victory over pecheneq troops (the Russians) became the era for those,

Who are elevated like the heaven (i.e. for other sovereigns).

One of your arrows completely destroyed 73 ships

Like prophet Hidru.

After these remarkable events, marches of the Russians against Shirvan practically finished. Concerning the further development of naval affairs in Azerbaijan, Mongolian invasion at the beginning of the XIII century negatively influenced upon this process since economic development of the country was hampered. Meantime from the end of the XIII century international sea trade through the Caspian Sea got great importance. Here appeared Genoese and Venetian merchants, whose ships sailed on the Caspian

Sea, and on the shores of which they founded their own trading posts [3, p. 118]. Commodity-money relations developing in the XIV century in northern Italy generated trade and political competition of two Italian cities, and their fight for super-profits of "Oversea trade" defined the appearance of Italian merchants, missionaries and pirates in the Near East, the Caucasus and on the Caspian Sea.

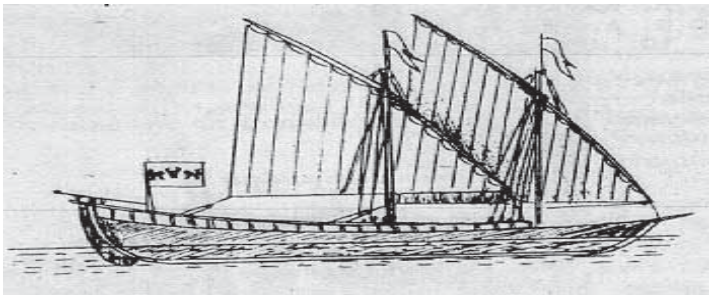


Fig. no.3. *Azerbaijani ship. 14 century*

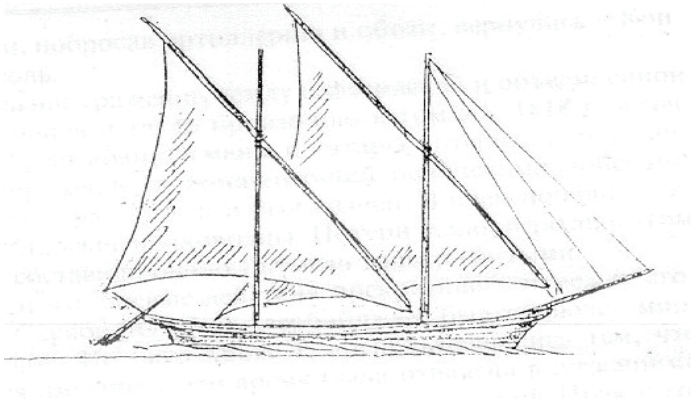


Fig. no.4. *«Fish». On A. Kontarin's information, S.A. Ahmadov's reconstruction (15 c.)*

It is also worth noting the fact that in Western Europe there was enough detailed information about the Caspian Sea and Azerbaijan, for instance, in the works of William Rubric (1215-1270), Mark Polo (the XIII century), Klaviho, Kontranini, Barbara (the XV century), Pavel Ioviya, Anthony Jankinson (the XVI century), A. Olearіya, Y. Streys (the XVII century) and many others. In particular, Klaviho noted, "There is the Baku Sea which is situated in the middle of the land and has no connections with other seas" [20, p. 58]. Yan Streys indicated that "On the Caspian Sea it is better to sail on a flat boat with the capacity of 40 to 50 seats, ships of bigger size and having deeper draught cannot pass

everywhere" [20, p. 301]. Describing his voyage on the Caspian Sea Hristofer Berrow, an employee of English trade company, mentioned anchorage Bildi (Bilgah) not far from Baku where he was in 1580 [21, p. 161].

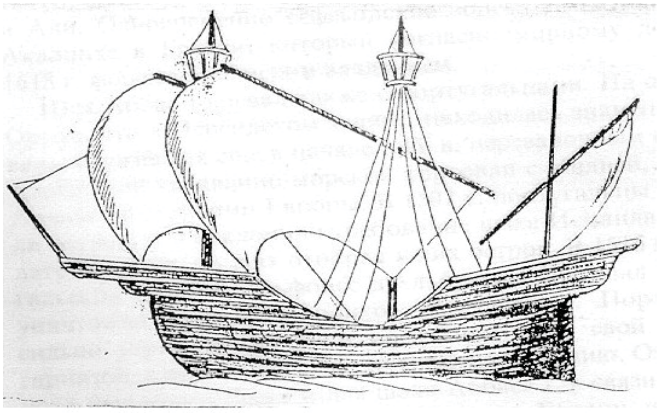


Fig. no. 5. *«Bousse». On A. Контарин's information, S.A. Ahmadov's reconstruction (15 c.)*

The importance of Baku as a significant port was noted in old-time Catalan atlas, formed in 1375. The Caspian Sea here was called the Baku Sea and the Sarra Sea. Cape Preala, which is recognized as present Pirallahi Island, was noted there too. This proves that the Catalans, famous as good seafarers, sailed on the Caspian Sea for trade purposes and they were well aware of the whole Caspian seaside, including Baku [4, p. 118]. Mark Polo testifies that already in the XIII century Genoese merchants sailed on the Caspian Sea on the ships that were basically dealing with silk [21, p. 33].

Baku kept its importance of a leading port city on the Caspian Sea even later, in the second half of the XV century, when Derbent had already lost its past importance as a port. The importance of Baku as the largest seaport is also obvious from the fact that beginning from the XV century different medieval authors marked the Caspian Sea as "the Baku Sea" - "mare di Bachu", "mare di Bachau", "mare di Baccu". The Venetian traveler of the end of the XV century Andzhonello called Baku a beautiful harbor on the Caspian Sea, used as a port for Tabriz. The contemporary of Andzhonello Donato da Leze noted that Baku "is a city, where big trade is carried on and for this reason it is identified as the Baku Sea. Here spices (brought here

from India - author) are shipped and carried to Astrakhan, a Tatar city on the river Volga" [22, p. 120].

The foreign travelers also noted the fact that the city was strongly fortified from the side of the sea. Kempfer, having visited Baku in 1683, wrote that "near the sea double walls of the city were built, opposite to open sea and stretched further into the sea as if parallel to the coast. The roadstead is closed from choppiness by the opposite cape, which lies about half crossing off the shore. Ships arriving from Russia, Dagestan, Circassia, Uzbekistan and Persia find a comfortable anchorage here" [4, p. 252]. Pretty valuable information about Baku and coastal regions of Shirvan is also contained in the records of Russian travelers, merchants and diplomats of the XV-XVI centuries, especially Afanasy Nikitin (the middle of the XV century), F. Kotov (the XVII century) and others [23, p. 69, 70, 144; 4, p. 44, 45, 221-231].

Another important anchorage port on Absheron was Bildi (Bilgah), which functioned during several centuries (the XVI-XVIII centuries). This fact is proved by archeological finds of goods from sunken ships, by discoveries of metallic anchors and anchor stones [24, p. 136].

As a whole, beginning from the middle of the XV century the Caspian region, through which lay main caravan routes, connecting India, China and Central Asia with the basins of the Mediterranean Sea and the Black Sea, as well as Persian Gulf with khanates situated on the Volga and the Moscow state, began to play one of the key roles in Asia-Europe world trade. Moreover, from beginning of the XVI century Baku, the largest port on the Caspian Sea, played the most important role in this trade. The main exports of foreign merchants from Baku were silk, salt, oil and saffron. In particular, merchants carried oil on their boats from Baku to Mangyshlak pier, from where it was sent to Central-Asiatic countries by caravan route. Russian merchants also exported Baku oil to Astrahan where it was mainly used for military purposes and then it was carried to Western European countries [3, p. 292].

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ALI-AGHA SHIKHLINSKI. PROFILE OF AN OPERATIONAL THINKER AND PRACTITIONER

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The paper outlines the profile of a a great operational thinker and practitioner, the three star general of artillery Ali-Agha Shikhlinski's. His military carrier, his inventions, operational thinking, and his targeteering approach to warfare are studied. His two key methods of artillery firing, which were great inventions for his time, are also explained.

Key words: *Ali-Agha Shikhlinski, artillery, shell, cannon, war, commander, thinker, practitioner.*

1. INTRODUCTION

The history of military provides many examples of good operational thinkers and practitioners; yet few could be considered brilliant. Throughout operations in history, operational commanders were good practitioners but not particularly known as good operational thinkers. The commanders who performed poorly at the operational level were often those who never achieved in thinking beyond the immediate physical combat. Some commanders usually focus on technological aspects of warfare and neglect the rest what are required. And, some commanders or military leadership prefer and emphasize the value of personal observation and lessons learnt but neglect the needs for studying military history, politics, economics, and cultures of other countries. A targeting approach to warfare is the best indicator that a commander's focus is too narrow and will almost likely result in poor performance at the operational level against a strong and skilful enemy [16,XI-19].

2. HISTORICAL BACKGROUND

The territory of Azerbaijan was divided into two parts as a consequence of Turkmenchay treaty signed between Russia and Iran in 1828. The North Azerbaijan was annexed to Russia, and Azerbaijan lost its independence for 90 years. As a consequence, the chapter of military art was ended up in Azerbaijan after the annexation to Tsar Russia. There were some reasons. Two were major factors for the end of the military art. On the one hand religion and on the other hand un-reliance on Azerbaijanis made Russia careful with military potential of the people of Azerbaijan. The Tsar Russia was assuming that if arms had been given to Azerbaijanis, they would try to reclaim their independence. This is why Azerbaijanis were recruited to military under the commandant of Russian officers only in case of clashes or engagements used to happen in the southern Caucasus. Very few numbers of Azerbaijanis used to be admitted to military schools.

Regardless of all obstacles and barriers, there were Azerbaijani military figures who were honored and awarded with high ranks. Ali-Agha Shixkhlinski was one of those brilliant operational thinkers and practitioners honored and awarded with St. Georgy Cross of Russia, "Cross of legionary" of France, etc.

3. A BRILLIANT THINKER AND PRACTITIONER

The three star general Ali-Agha Shikhlinski (1865-1943) was one of the best talented artillery commanders of the Russian Tsar army. He was considered "God of Artillery". He is known for his combined artillery fire method in Port-Arthur engagements between Russia and Japan, artillery shelling over own troops, and "Shikhlinski triangle".

Ali-Agha Shikhlinski's experience in wars developed a mental sophistication that enabled him to think ahead, anticipating artillery shelling and developing counter artillery shelling. He was a non-traditional commander of his time. An outstanding figure of the Russian artillery, author of "history of the Russian artillery", professor Yevgeni Barsukov considers Ali-Agha Shikhlinski as an artillery man who stood on the top of artillery pyramid of the Russian artillery men [4].

As the World War I started, the artillery defense of the capital city of Russia, Petrograd was assigned to Ali-Agha Shikhlinski, although there

were experienced cadres in artillery among Russians. The decision was not accidental. He was already known as the God of the Russian artillery at that time.

In World War I, he designed and developed tactics for artillery firing over own troops, and published his thoughts and scientific outcomes in his article "fire over own troops". That was a topical issue for the very period. Because, usual deployment of artillery behind own troops could not appropriately strike on enemies causing obstacles for own troops due to miscalculation of ranges. Besides, it was very hard to define fire accuracy with bare eyes on desert, mountainous and hilly landscapes. Ali-Agha Shikhlinski due to his brilliance as an artillery operational thinker designed and developed possibility of maximum efficiency of fire over own troops[10].

Defining the position of artillery was broadly studied in Shikhlinski's researches. Those days, the command and control of artillery fire system was a crucial issue as there were not any devices and technologies. A. Shikhlinski studied artillery fire in the combined and grouped shape and put up his arguments and thoughts about decision making for deployment of artillery means.

Finally, in World War I, he theoretically and practically proved his "triangle" which was a breakthrough in his time.

4. ALI-AGHA SHIKHLINSKI'S "TRIANGLE"

The idea of his triangle is targeting, defining the grids of a spot in order to have accurate and precise artillery fire. For example, an observer used to have hard time to define the precise grids and coordinates of a target in a field for a battery commander. It was becoming very difficult to direct shelling onto a target due to mis fixing the grids of a target. Gadgets like the compass were not applied in those days yet. The range to a target and its grids used to be defined according to map scale or visually. Consequently, it used to have a negative impact on accuracy of an artillery fire. The purpose of working out the triangle is that an observer to be able to define exact grids of a target while passing the grids to a battery commander, and eventually to succeed in an accurate fire control.

There were not any methods or a way of the calculation across the world by that time.

When Ali-Agha Shikhlinski started to think of it, first of all he drew the positions of an observer, a

battery commander and a target. He connected the point of an observer to a battery commander with a straight line and the target to the position of the observer and the battery commander. And, so he worked out his triangle.

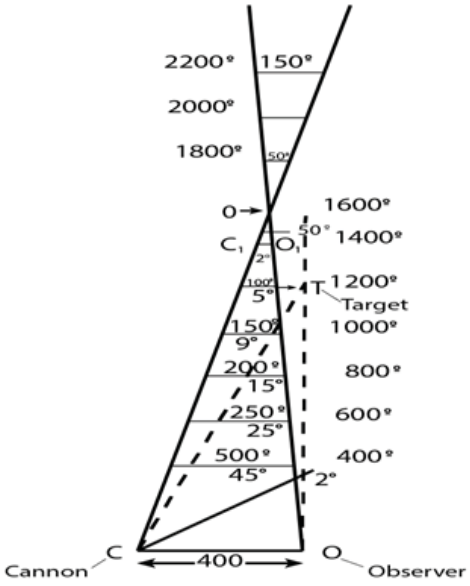

Fig. no. 1. *Ali-Agha Shikhlinski's "Triangle"*

Defining the range between a battery commander and a target based on a map, A. Shikhklinski noted down the figures on the triangle, and then divided them into parts in parallel to the line connecting positions of an observer with a battery commander. According to this deviation and formula, he could precisely find out the range, and position of the target as well as the measures of deviation of fire from a target. In case of shift of a target, by applying fire triangle it became easy to find out the grids and point a fire onto the target [11].

Besides, the Russian artillery, Shikhlinski's triangle used to be applied by Austrian and French artilleries as well. He wrote in his memoirs: "*the triangle was not only widely used by our artillery but also by the French artillery as well. I came to know the triangle was being applied in the Austrian army late 1920."* [12].

In 1913, commandant of French army HQs, general Joffr visited to an "artillery officer" school in Russia with a delegation of 17 officers. *"They requested us to demonstrate fire of new cannons including howitzers. Besides, they also asked for explaining fire control. All fires which were executed for the visitors were commanded by Shikhlinski. Admiring of the results, the French delegation awarded Shikhlinski with "Honorary Legionary Cross of France"* [13].

5. DESTRUCTION OF INVISIBLE TARGETS

One of the great inventions of the three star general was on destruction of invisible targets.

According to Shikhlinski, observation was the key element for artillery fire. He was claiming the professionalism of an observer not related to his or her eyesight, it is a matter of healthiness of neuro and ability of making reasonable results out of less observation. This skill could be gained throughout a long experience. He was offering the observers not to watch the fires of his or her own batteries but also the fires of others as well, and eventually an observer could develop his or her skill.

Targets defined on mountainous landscape are usually located behind hill and summits. And of course, it was making difficult to observe the outcomes of artillery fires. The observation positions used to be advised to be located on the highest points and founding a set of observations positions. He was arguing that when an observation post is located on a higher altitude than the position of a battery, the results of the observation might lead to some mistakes. The assumption about the mistakes was mentioned in artillery guidance books of those days.

Shikhlinski was differing the explosion of shells according to a straight line between a cannon and a target. He used to name an explosion below this line as foot explosion, an explosion over the line (less than 6 metres) as low explosion and the explosion above the line as flat explosion.

An observer might figure out an explosion happened at low level as at high altitude. For example, an explosion that took place at P point might be seen as an explosion happened at P1(low level) point (Figure 2). An explosion that took place at high point might be seen as an explosion happened at low level (Figure 2).

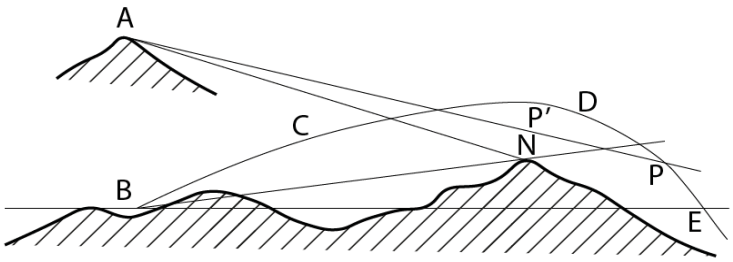

Fig. no. 2. *Destruction of invisible targets*

An explosion happening before reaching a target might be detected as an explosion at low level (Figure 3). The reason is that while observing an observer can see NP part of the landscape, and eventually he assums an explosion happened on the very (target) point.

To escape these mistakes and misassumptions, Shikhlinski was proposing the following to be taken into consideration by artillery fire observers:

a) **explosion smog -** when an explosion takes place at low level the smog of the explosion is pressed by air, eventually the explosion smog shapes in triangle. In this case, the explosion could be assumed taken place at low level. But if an explosion occurs at high level, the smog is not shaped in triangle by air pressure, and the smog spread horizontally;

b) when an explosion happens at low level the shrapnels fall on ground and blows dust into air, and the smog of the explosion is mixing with the very dust. But, when an explosion happens at high level, the shrapnells fall down far from each other and each of them blows dust into air.

These happen when there is no wind.

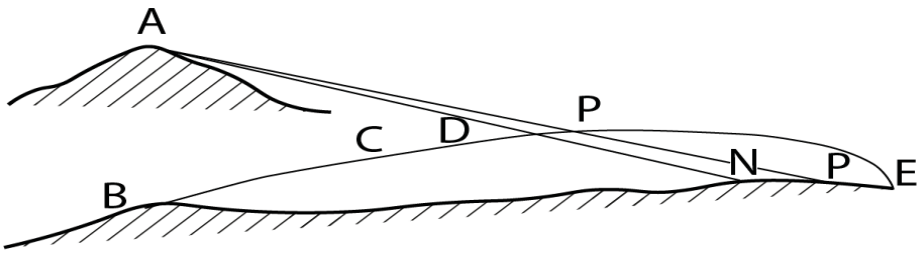

Fig. no. 3. *Explosion at low level*

When wind blows the smog of an explosion occurring at low altitude, wind spreads it in parallel with direction of the wind. But when the explosion takes place at high altitude, it results in the spread of the smog at high altitude.

According to A. Shikhlinski, if an observer is an experienced person, based on the above mentioned criteria he can guide cannons to precise pointing. But, he proposed not to absolutely rely on these criteria. This is why he also had some additional proposals:

1. Fire should be done in combination with shrapnels of grenades. That is to say, if the points of explosions are not observed clearly, then fire is to be done with grenade ammunitions.

2. The gun layer of cannon is to be adjusted at the first firings and then strikes by fire are to be implemented.

3. Shikhlinksi was offering gun laying in a mountainous relief to be executed in accordance with the calculation of percentage of explosions.

6. CONCLUSIONS

Ali-Agha Shikhlinski made significant contributions to the operational art. In fact, he laid the foundations for the Russian theory and experience of artillery firing.

The works and inventions of the three star general are unknown in the West, but he is still very famous among the artillery men across the CIS countries.

Colonel-general Ali-Agha Shikhlinski was a commander who showed a remarkable ability to think and act operationally at some points in his career.

Besides, being a tactical and operational theoretician and practitioner in the nineteenth century, Shikhlinski was a figure explaining the philosophy of warfare. He noted down his opinions and thoughts in his article “Future warfare”.

He was emphasizing that actors are to well evaluate the morale factor in a military campaign. According to him, besides methods, skills, weaponry, etc. the following are to be taken into consideration: the reason of a war, purpose and desired end state.

He was trying to explain in fact the instruments of grand strategy - the strategic objectives, desired end state, human resources, political support, and support by the people.

He was also emphasizing the importance and needs of propagation for relying on the strength and power of one’s own army.

His military legacy could be a great opportunity for future artillery commanders to possess a rare combination of high military education and combat experience.

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