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CONTENTS

PERFORMANCE-BASED BUDGETING IN THE DEFENSE SECTOR: ORGANIZATIONAL STRUCTURE ISSUES

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Today's challenging, unpredictable, and volatile international security environment and recent developments in Ukraine require the states of Eastern Europe, especially those that are not members of powerful military alliances, to focus on strengthening the most important instrument of national power, military power, in order to be able to defend their national interests. Enhancing military capability is usually associated with an increase in funding for defense programs. However, having a significant defense budget does not guarantee security, and the main question is how efficiently and effectively defense funds are allocated to particular programs, projects, or activities. The way to improve the efficiency and effectiveness of managing defense funds is through the introduction of the performance-based (program) budgeting approach. At the same time, it must be kept in mind that programs cannot disregard the structure of the MOD departments and services, since budgets are implemented by allocating resources to organizational units to use for conducting activities aimed at producing outputs. In this paper, I proposed some structural changes in order to place the organizational structure of the MOD of Georgia on more of a "product line" basis; bring it more in line with the basic principles of management, and improve capability planning and program development processes.

Key words: program budgeting, organizational structure, performance, output, outcome, military capability.

1. INTRODUCTION

In today's challenging, unpredictable and volatile international security environment and in light of recent developments in Ukraine, the states of Eastern Europe, especially those that are not members of powerful military alliances, must focus on strengthening the most important instrument of national power, military power, in order to be able to defend their national interests.

In resource-limited conditions, nations must resolve the so-called "guns versus butter" dilemma and achieve the proper balance between investment in defense and civilian goods that best suits the needs of citizens. The choice to be made is partly influenced by the military spending and military posture of potential adversaries (Military Wiki, n.d.). Depending on security situation, defense may take precedence over social issues, especially in times of crisis or war. However, in times of peace, decisions to increase defense budgets are usually difficult to make. It should also be borne in mind that having a significant defense budget does not imply guaranteed security, and the main question is how efficiently and effectively defense funds are allocated to particular programs, projects or activities.

The management of defense resources implies converting them into military capabilities in a timely and cost-effective manner,

in consistency with the government strategy. The way to improve the efficiency and effectiveness of managing defense funds is through the introduction of the performance-based budgeting approach that shifts the focus to managing results rather than managing spending and provides managers with "greater discretion in the use of resources and deciding the input mix" (IMF, 2018, 79).

One of the more advanced government-wide performance budgeting systems that uses performance information systematically is program budgeting, which, when properly applied, provides a clear linkage between allocated resources and desired/produced outputs and outcomes and enables defense decision-makers to compare the costs and benefits of alternative spending options in order to choose the most efficient and effective (Robinson, 2011).

An appropriate definition of programs and other elements of the so-called program hierarchy is the foundation of good program budgeting, and the *fundamental principle* in determining programs is that to serve their intended purpose, they must be *results (output/ outcome)-based* to the maximum possible extent. They should be defined as groups of *outputs* (products or services) delivered to external parties that have common *outcomes* (so-called "product lines"

[1]). Along with this, in developing a program classification, it is necessary to take into account "that programs cannot disregard the structure" of government departments since "budgets are implemented by allocating resources to organizational units to use for activities" aimed at producing outputs (Robinson, 2013, p. 5). To ensure the efficiency and effectiveness of the defense resource management process [2] and improve organizational performance, the structure of the Defense Ministry should be organized on a "product line" basis to the maximum possible extent and comply with the basic principles of management.

Constantly changing security environment, emerging threats, volatile economic environment, improving technology, and development of new operational and management concepts may occasionally cause changes in the rules by which the defense sector is governed, as well as organizational changes.

In my recent article (Okromtchedlishvili, 2022a), I supposed that the current program structure of the MOD of Georgia does not fully comply with the above most basic principle of defining programs and proposed an updated defense program structure.

*The **main goal** of this paper is to propose some structural changes in order to place the organizational structure of the MOD of Georgia on more of a "product line" basis, bring it more in line with the basic principles of management, and improve capability planning and program development processes.*

Due to the general lack of detailed information and limitations in obtaining primary data on the defense sector in terms of the secrecy, the study mainly relied on information and secondary data available from open sources.

2. PRODUCTION MODEL OF PERFORMANCE IN THE DEFENSE SECTOR

For a better understanding of the processes occurring in the Defense Ministry, if it is considered as an enterprise, the Production Model of Performance in the Defense Sector can be applied (Okromtchedlishvili, 2022b).

The starting point of the production model is the identification of the national interests; the security situation; threats and anticipated scenarios; risk assessment; and the definition of national security and defense objectives and tasks, as indicated in the National Security and Defense Policy documents. National security and defense issues (1 in Figure 1) persuade defense planners and decision-makers to elaborate the military capability requirements needed to achieve defense objectives and tasks and prioritize these

requirements according to available resources (2). These priorities, following the model, are translated into objectives (3) of the defense program under consideration. By comparing policy objectives with needs (prioritized military capability requirements), it is possible to assess the relevance (7) of the policy being pursued.

organizations carry out activities (5) to produce outputs/capabilities (6). Economy (8) implies the ratio of monetary inputs to other inputs (e.g., the cost of a tank, weapon system, or uniforms). The input-over-output ratio means efficiency (9). As Omitoogun and Hutchful (2006) noted, "efficiency implies the optimal output for any given input; that is, the best value for money" (p. 43).
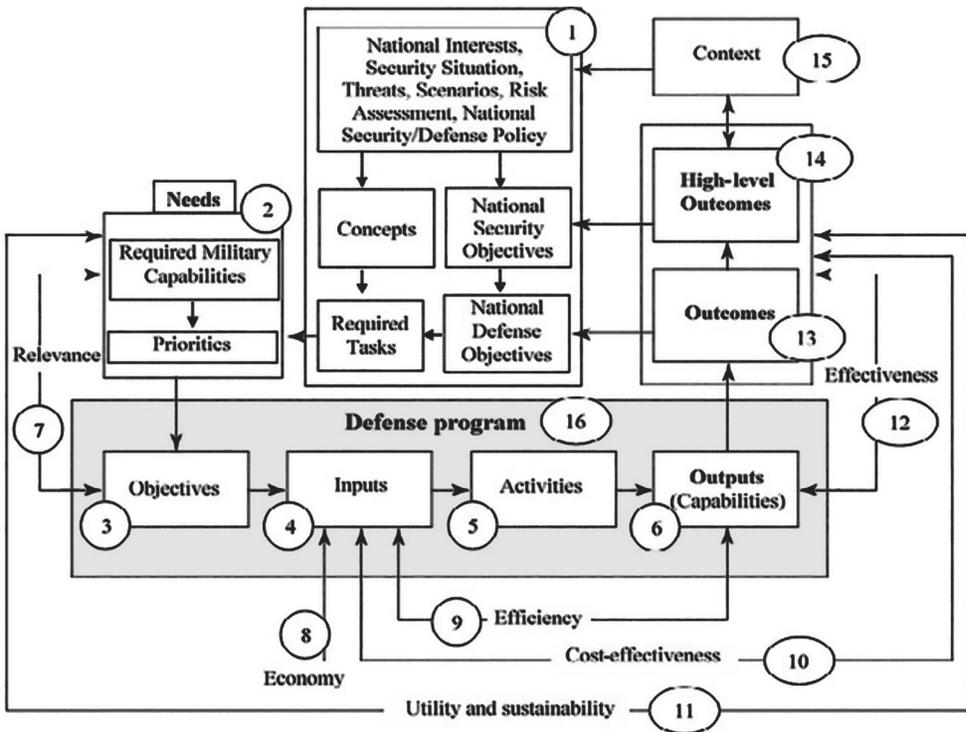
Note: Adopted from Van Dooren et al. (2015)
Fig. 1 Production Model of Performance in the Defense Sector

2.1. Defense Outputs and Efficiency

Consuming allocated inputs/resources (such as human, financial and material) (4), defense

The often applied definition of defense outputs in terms of the numbers of military personnel, military units, warships, and aircraft squadrons is not sufficient. For example, troop numbers can be a

misleading indicator if training, sustainment, and readiness for operations are ignored, as well as the number of warships, tanks, and aircraft without data on their operational availability currently and in the future, and their average age (Hartley, 2011).

The main output of Defense – *Military Capability* is comprised of a complex set of variables and can be considered as a function of multiple components, and defined

As a comprehensive force structure consisting of its constituent force elements/capabilities (combat, combat support, combat service support, training, management, command and control) with an integrated set of aspects categorized as doctrine, organization, training, materiel, leadership development, personnel, and facilities, and with an appropriate readiness level [3] assessed at a concrete time. (Okromtchedlishvili, 2022a, p. 94)

Readiness in this case can be considered an *output indicator*.

2.2. Defense Outcomes and Effectiveness

Defense, with its main desired outcome in the form of deterrence and defense, is a classic example of a public good that is non-exclusive and non-competitive. For example, the consumption of an air defense service by a particular resident of Tbilisi does not affect the consumption of his/her neighbors. Moreover, once air defense is provided, no one can be excluded from consumption (Hartley, 2012).

Outcomes can be intermediate (13 in Figure 1) or final/high-level (14). The outcomes often depend on the context (15), over which the organization or program has limited or no influence. Such contextual factors may include socio-economic or environmental trends, as well as policies of other governments. In the case of the Ministry of Defense, these can be relations with strategic partners and opponents, trends in regional or global security, changes in the political situation both within the state and at the international level, etc. The ratio of output to outcome is the *effectiveness* (12). The ratio of the input to the outcome is called *cost-effectiveness* (10). The outcomes of the Defense Ministry must address the needs of society, for example, providing deterrence from potential adversaries or defense in the event of aggression. The confrontation of needs and outcomes allows evaluation of the program's or organization's *sustainability* and *utility* (11) (Okromtchedlishvili, 2022b).

The main outcomes of the defense program should be determined on the basis of the defense objectives specified in the

defense policy documents. In the case of the Georgian Ministry of Defense, the Strategic Defense Review (SDR) for 2021-2025 defines three main defense objectives, namely: *ensuring deterrence and defense; supporting civil agencies to handle various emergencies;* and *contributing to strengthening regional and international security.* The *availability* and *capacity* of the Georgian Defense Forces (GDF) to carry out their assigned tasks and achieve or contribute to the achievement of the outcomes (national defense objectives) and high-level outcomes (national security objectives) can be defined as *outcome indicators*. A means of confirming the indicators can be considered the results of research carried out according to a certain methodology, the results of an assessment conducted by a local or international organization, etc. (Okromtchedlishvili, 2022b).

3. PROPOSALS ON STRUCTURAL CHANGES

As was mentioned above in the study, a core issue in good program budgeting is the appropriate definition of programs and other elements of the so-called program hierarchy. The ideal of program budgeting is that programs should be *results (output/outcome)-based* to the maximum possible extent; that

is, they should be based on groups of *outputs* (services or products) delivered to external parties that have *common outcomes* (so-called "product lines") (Robinson 2013, p. 4).

As Robinson (2013) also noted, in developing a program classification, it is necessary to take into account

That program cannot disregard the structure of their government, because budgets are implemented by assigning resources to organizational units to use for activities designed to produce outputs. (p. 5)

Along with the proposed changes in the structure of the defense programs (Okromtchedlishvili, 2022a, p. 97-100), *it is desirable to consider some structural changes as well, in order to place the organizational structure of the MOD of Georgia on more of a "product line" basis, bring it more in line with the basic principles of management, and improve capability planning and program development processes.* The most obvious, in my opinion, are the necessary changes in Infrastructure, Military Police, Land Forces, and structural units of the Georgian Defense Forces (GDF) responsible for the capability planning and programming process.

3.1. Infrastructure

It would be advisable to detach the infrastructure function from the Force Logistic Support Command

and establish a separate Defense Infrastructure Organization in the form of a legal entity of public law to take over the infrastructure-related functions currently provided by the aforementioned Command, such as: carrying out design and construction activities in the system of the MOD; ensuring relations related to the registration of real estate; forming current infrastructure requirements and submitting them to the State Procurement Department of the MOD; registration and accounting of real estate used by the MOD, as well as its management and maintenance related activities; providing the structural subdivisions of the MOD with communal and household conditions; providing bath-laundry services for the personnel of the Defense Forces; control of engineering networks of electricity, heating, water supply, sewerage, natural gas and other facilities used by the Ministry; accounting of utility costs, etc. (MOD, 2014). It should be noted that the lack of a structural unit responsible for infrastructure development in the Ministry of Defense was indicated as a shortcoming in the report on the results of the audit of the effectiveness of real estate management conducted by the State Audit Office in 2019 (SAO, 2019). Although the Department of Infrastructure Management, Standardization and

Codification was established in 2021 (MOD, 2021a), the tasks of this department are to develop a policy for the development of the infrastructure system of the Ministry and monitor its implementation, but not to plan and conduct day-to-day infrastructure-related activities and support the Defense Forces "by enabling military capability through planning, building, maintaining and servicing infrastructure over the lifecycle of acquire, operate, maintain and dispose" (MOD UK, 2020). [4] In turn, the Force Logistic Support Command will focus on providing logistics support to the GDF units both in peacetime and in combat, and will serve as the central functional subprogram for the logistics function to centralize the management of scarce resources and ensure their allocation to subprograms with the highest priority.

3.2. Military Police

As for the Military Police Department, it would be advisable to separate the functions of conducting operative-investigative activities and investigating criminal cases from the Department and assign these functions to a structure created within the Civil Office of the Ministry (for example, the Criminal Investigation Service). The Military Police Department, in this case, can be reorganized into the Military

Police Command, subordinated to the Chief of Defense Forces, which will focus on providing combat and military police support to combat elements and military operations (MOD, 2015).

3.3. Land Forces

It would also be advisable to consider some changes related to the Land Forces.

According to Harborne *et al.* (2017),

There is a critical difference between the "institutional" military forces under the command of the service chiefs, which are focused on force provision, and the "operational" military force, under the command of combatant or joint-force commanders, which is focused on force employment. (p. 181)

As a rule, the program managers for the force provision elements are appointed senior military officers, known as service chiefs or chiefs of staff, who lead the military forces and are responsible for establishing (organizing), developing, and maintaining combat ready forces in accordance with the national defense (military) strategy. The existence of the force provision requirements does not depend on whether or not military forces are employed operationally, but when employed, as mentioned above, they usually fall under a different command structure (Harborne *et al.,* 2017).

As a result of the structural reorganization, instead of the Land Forces Command of the MOD of Georgia, two regional commands were created. [5] According to the Law of Georgia "On the Defense of Georgia" (POG, 1997), the main purpose of the Eastern and Western Defense Commands is to manage the subordinate units in the operation area specified in the defense plan and to perform the set assignments. The Commands are responsible for the force employment, the near-term planning and preparation (through training and exercises) of the existing forces to fulfill their assigned missions within the near future, as well as for the force development, which, on the contrary, is forward looking and entails mid-term and long-term planning to invest in building "the future force structure through defense resource management, human resource management, and logistics" (Taliaferro et al., 2019, 13).

According to the MOD UK (2020),

Defense Force Development (DFD) is an evidence-informed process by which forces and capabilities are designed, tested and generated to meet policy requirements effectively and efficiently [...and] includes the development of Concepts, which describes how forces will need to operate and adapt

to meet predicted future threats and subsequently develop the military capability that Defense needs now and in the future. (p. 13)

Effective force development requires the appropriate structural and personnel capabilities of the above-mentioned commands to conduct capability planning, acquisition planning, program planning, and budget planning processes, which implies the reallocation of human and material resources to augment the existing structural units or the creation of new ones responsible for force development. It should also be taken into account whether focusing on force development processes will negatively affect the quality of the force employment processes (planning and preparation of military operations, training and exercises of troops available).

In the case of Georgia, given the current and anticipated number of land forces maneuver units (SDR 2021-2025, 2021) and the basic principles of management, maybe it is reasonable to consider the establishment of a unified Land Forces Command, which will be responsible for the development of the Land Forces as a single service branch and its constituent branches of the armed forces (infantry, armor, artillery, etc.), including capability planning, acquisition

planning, program planning, and budget planning. To comply with the principle of unity of direction, the Land Forces will be developed on the basis of a unified plan; the Land Forces Commander, as a program manager, will direct the activities of the subordinate units (subprograms) and ensure their coordination to produce land forces capabilities in order to achieve the main common goal: the combat and mobilization readiness of the Land Forces units. Henri Fayol (1949), the founder of the School of Administrative (Classical) Management, emphasized the principle of unity of direction and expressed it as follows:

One head and one plan for a group of activities having the same objective [, which] is the condition essential to unity of action, co-ordination of strength and focusing of efforts. (p. 25)

It should be noted that according to the Law of Georgia "On the Defense of Georgia" (POG, 1997), in times of crisis, the Chief of Defense Forces is authorized to

Create, depending on the objectives, an operational group (a temporary military structure for completing operational-level tasks, which may include some tactical groups/subdivisions) and a tactical group (a temporary military structure for completing tactical level tasks,

which may include several military sub-divisions), and define the rules for their management. (Article 8)

It is also important that, during the war, the Land Forces Command should not be viewed as an intermediate link in the command chain of the Defense Forces but as a unified integrated body of operational-strategic command with the General Staff under the leadership of the Chief of Defense Forces. As for the brigades under the Command, their headquarters structures should be strengthened and improved in order to be able to form regional operational-tactical level headquarters on their basis to provide command and control of the aforementioned operational and tactical groups during a crisis.

The Finnish experience in this matter is interesting and significant. As a result of the reforms carried out by 2015, the number of structures in the Finnish Defense Forces was reduced, they were consolidated; the logistic was centralized; and one level of command was abolished - the Regional Commands, whose competencies were divided between the Land Forces headquarter, brigade-level units and their regional offices, and for some regional tasks (e.g., planning statements, statements related to environmental protection) to the Logistics Command of the

Defense Forces. Eight brigades were subordinated to the Army (Land Forces) Command, which steers the Army activities in accordance with the set requirements for readiness and force production (development); leads the planning, implementation and lifecycle management of projects and significant defense acquisitions; and in addition to the various divisions, also includes Inspectors of Service Branches of the Army. Under the brigades, there are twelve regional military districts (offices), which are responsible for recruiting reservists, preparing and activating them in times of crisis, forming local battalions, and organizing territorial defenses in their areas of responsibility (Defence Command, 2016).

At this stage, an important issue is to conduct a thorough analysis of the entire structure of the MOD of Georgia in order to eliminate unnecessary (redundant) structures and avoid duplication of functions, especially in the areas of supply and administration.

In case of implementation of the above structural transformations, the proposed Major Force Program - Defense Forces Capabilities (Okromtchedlishvili, 2022a, p. 98) will look as shown in Figure 2.
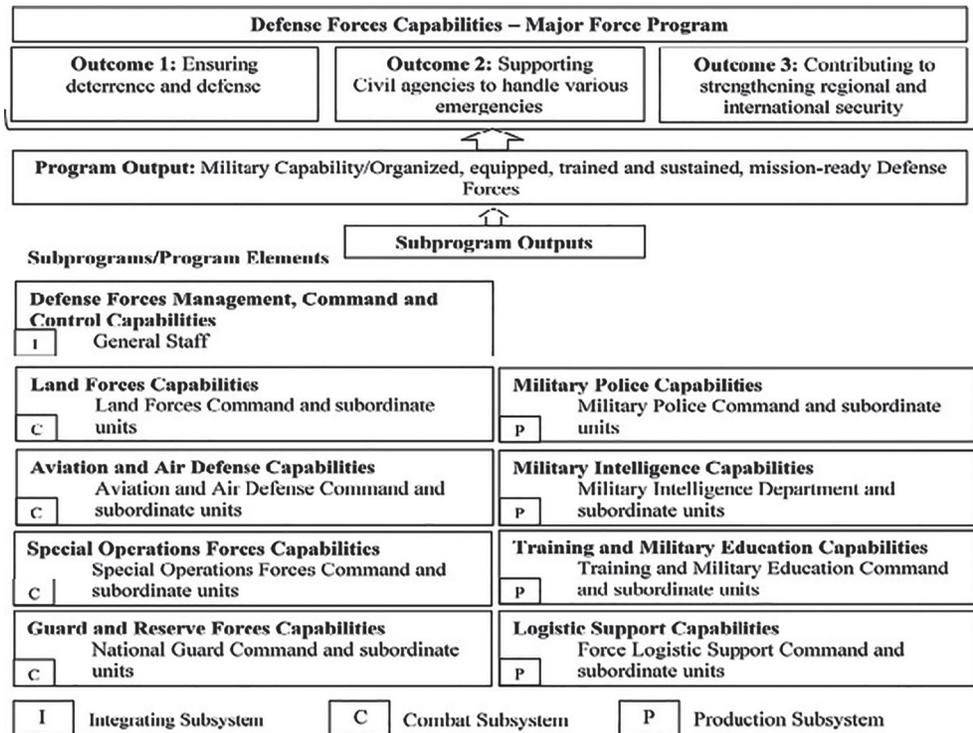
Fig. 2 Sample Major Force Program Structure for the MOD
after the Proposed Structural Transformations

3.4. Structural Units Responsible for the Programming Process

Effectively managing the day-to-day programming process requires permanent personnel with unique skills and experience. David Novack, one of the founding fathers of program budgeting, noted that the programming office should be staffed by analysts who possess specific mathematical skills, as well as extensive knowledge and experience in key areas related to the area under management. In the case of the Defense Ministry, good program analysts can be found in fields such as finance, personnel management, intelligence, acquisition and logistics; land, air, and special operations. It is advisable for staff to be a mix of military and civilian personnel, since military analysts will provide insight to military issues, while civilian analysts usually have higher academic credentials (Taliaferro *et al.,* 2017). It is crucial that the structural unit working on the resource management issues (including the programming process) has a direct link to the relevant highest decision makers

(e.g., Minister of Defense, Chief of Defense Forces, Chief of Service, Force Commander, etc.).

Figure 3 shows the main structural units of the MOD of Georgia responsible for the capability planning and programming processes.

The core responsibilities of the Department of Defense Policy and Development are: assessing the security environment of the country and developing proposals on defense policy directions; analysis of defense capabilities, development of priority requirements, as well as the definition of short, medium and long-term plans for the development of the defense forces; development of the defense policy, planning and strategic documents, coordination of the process of their elaboration/revision; coordinating the planning, programming and budgeting process, as well as participating in the defense budget formation process within the framework of resource management, etc. (GOG, 2018).

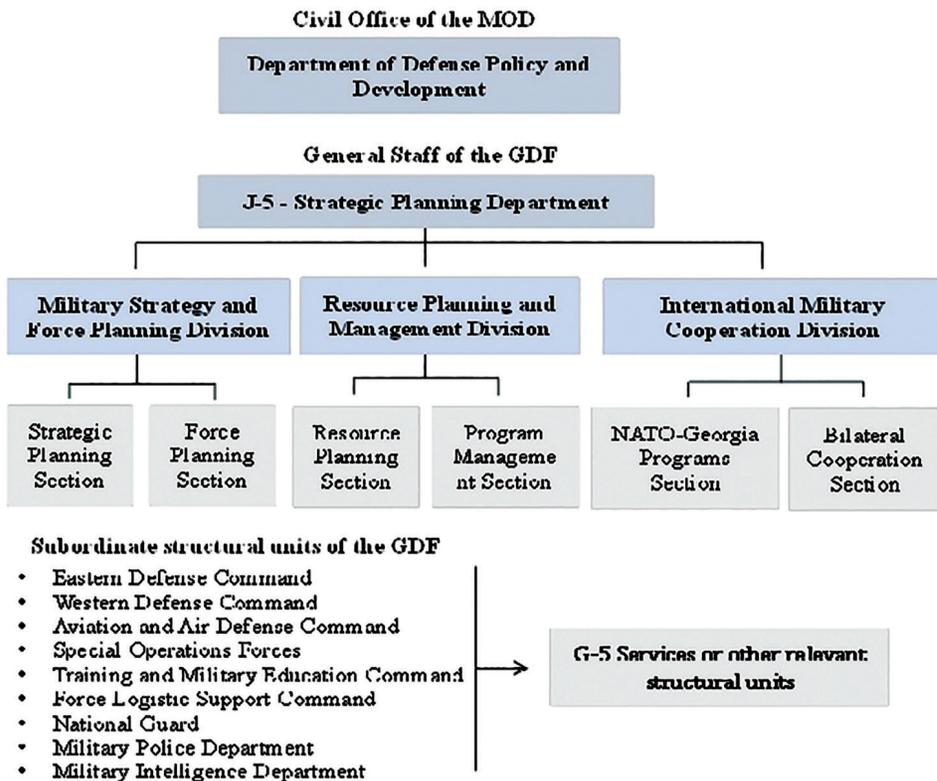J-5 Strategic Planning Department of the General Staff of the GDF participates in the process of

Fig. 3 Major Structural Units of the MOD of Georgia Responsible for the Programming Process

elaborating defense policy, strategic planning documents and resource management policy; determines the capabilities for defense and develops medium and long-term military plans and strategic directives and projects for the development of defense capabilities; prepares, coordinates and monitors the implementation of bilateral and multilateral military cooperation programs and plans with partner countries; monitors the implementation of the defense forces' programs, provides comprehensive analysis, evaluation and recommendations for the efficient use of resources, etc. (MOD, 2021b).

As for the subordinate structural units of the GDF, their G-5 services or other relevant divisions involved in the resource management process, develop recommendations for changes in the structures of the units and their functions based on the analysis of combat capabilities and structural compliance; participate in the resource planning process; develop recommendations on the purposeful, economic, and efficient spending of resources; develop long-term development plans for the Commands, etc. (MOD, 2018).

Defense is a complex system that, in peacetime, must transform allocated resources (inputs) into mission-ready forces (outputs).

The strategic guidance, framework, objectives and milestones for the development of the defense forces are provided by the National Security and Defense Policy documents. Defense planning, by using analytical, planning, and programming efforts, determines what kind of armed forces are suitable, feasible and affordable to the state. Defense planning is aimed at converting the national security and defense policy, and derivative defense strategies and guidance documents into a set of achievable and affordable capability requirements, spending priorities, programs, budgets, and ultimately into a comprehensive and capable force structure that will enable the accomplishment of the assigned defense tasks and achievement of the national defense and security objectives.

The capability planning process should focus on generating a force (capability) development plan; it determines and prioritizes the means (capability requirements, derived from analyses of strategic policy guidance, scenarios, and concepts) necessary to develop the future force structure in accordance with the minister's policy guidance and known fiscal restraints, and

should be completed well in advance to inform the programming and budgeting processes.

Programming provides a critical link between capability planning and budgeting and determines activities and, according to the minister's policy guidance and within fiscal constraints, allocates resources necessary to develop capabilities over a multi-year period. It produces a program plan "that allocates resources (inputs) to force elements over time in order to create capability (outputs)" and enables "decision makers to understand the costs and tradeoffs required to implement a capability proposal" (Taliaferro *et al.,* 2019, p. 52). The main outputs of the programming are feasible/affordable capability mix and approved defense forces program.

As Taliaferro *et al.* (2019) noted, in small defense establishments, the programming process can be simplified. In the case of the GDF, based on its size and organizational structure, instead of each of the subprogram managers preparing their own subprogram recommendations (proposals), it would be advisable the central department in the General Staff to assemble the Major Force

Program according to capability development plans submitted by each subprogram manager. The baseline will be set based on the last approved subprogram; actual changes will be made to create a new baseline for new solutions, and then data on inputs will be requested from the subordinate organizations. The central programming staff will act as an input integrator, providing feedback to subprogram managers when their portion of the program proposal exceeds financial limits. The central programming staff will manage all the data and provide feedback to staff in each subprogram manager's organization.

The first year of the approved defense programs is the basis for budget development (Taliaferro *et al.*, 2019). Finally, the approved defense budget is executed to create the actual military capability - defense forces capable of achieving the strategic goals set.

In the case of the introduction of the Major Force Program and implementation of the structural changes proposed above in the paper, it is advisable to consider amendments to the GDF structural units responsible for the programming process, as indicated in Figure 4,
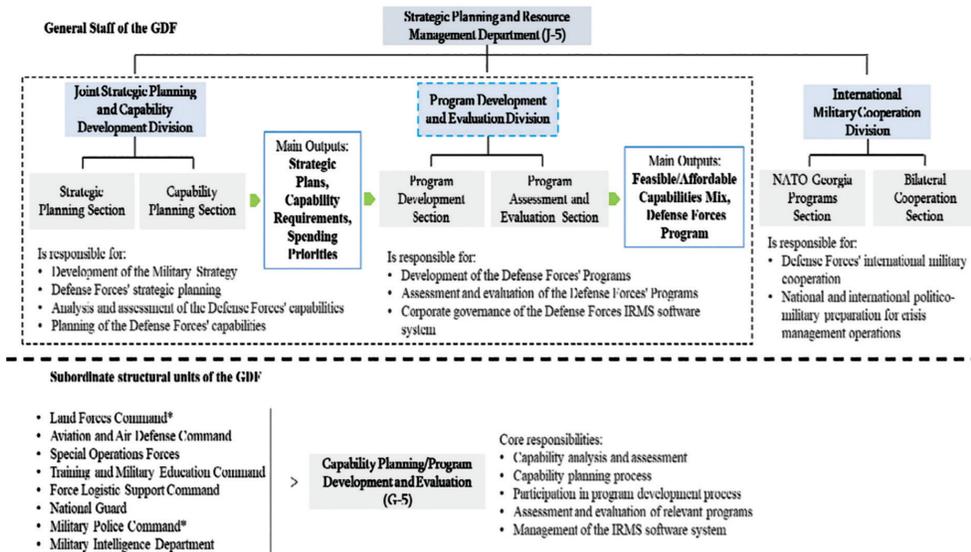
Note * Proposals for the creation of the Land Forces Command and transformation
of the Military Police Department are given in the previous subsection
Fig. 4 Sample of Major Structural Units of the GFD Responsible
for the Programming Process

which will improve capability planning and program development processes.

4. CONCLUSIONS

The increasingly tense and explosive international security situation caused by recent developments in Ukraine requires Eastern European states, especially those that are not members of powerful military alliances, to focus on strengthening the most important instrument of national power, military power, in order to be able to defend their national interests.

Strengthening military capability is usually associated with an increase in funding for defense programs. However, having a significant defense budget does not guarantee security, and the main question is how efficiently and effectively defense funds are allocated to particular programs, projects, or activities.

The way to improve the efficiency and effectiveness of managing defense resources is through the introduction of the performance-based budgeting approach.

In particular, one of the more advanced government-wide

performance budgeting systems is program budgeting, which uses performance information systematically.

It should be noted that without implementing the results-based defense program structure, with military capability defined as a main output and outcomes based on national defense objectives, and without adequate and effective performance indicators and their application to assess the performance of program managers, program budgeting in the defense sector does not make sense as a tool to improve the efficiency and effectiveness of the defense resource management process; this will only make it easier and simpler for the ministry to allocate and use budgetary resources by loosening line item controls, without obtaining the core benefits of program budgeting.

Since programs cannot disregard the structure of the MOD departments and services, and budgets are implemented by allocating resources to organizational units, in this paper, some changes to the organizational structure of the MOD were proposed. They are aimed at placing the structure of the Ministry on more of a "product line"

basis; bringing it more in line with the basic principles of management, and improving capability planning and program development processes.

Finally, I believe that the proposals presented in this article will be useful in enhancing the efficiency and effectiveness of the defense resource management processes and improving the organizational performance of the Ministry.

ACKNOWLEDGEMENT

ENDNOTES

[1] According to Kotler *et al.* (1999), "a product line is a group of products that are closely related because they function in a similar manner, are sold to the same customer groups, are marketed through the same types of outlet, or fall within given price ranges" (p. 588).

[2] "Defense resource management," as used here, includes a range of activities, from the definition of mid- to long-term defense objectives, through the formulation of intermediate plans to achieve those objectives, to the development and execution of annual

budgets that implement the plans, and finally to the collection and review of data on the results of actual expenditures and the adjustment of the plans to recognize those results" (Gordon *et al.,* 2011, p. 2).

[3] Doctrinally, readiness is defined as "The ability of U.S. military forces to fight and meet the demands of the NMS [National Military Strategy]." CJCS Guide to the Chairman's Readiness System. CJCS Guide 3401D. 15 November 2010. Available at https://www.jcs.mil/Library/CJCS-Guides/

[4] Excerpt taken from the mission of the Defense Infrastructure Organization (DIO) of the Ministry of Defense of the UK: "The DIO is the professional estate expert for Defense, supporting the Armed Forces by enabling military capability through planning, building, maintaining and servicing infrastructure over the lifecycle of acquire, operate, maintain and dispose" (MOD UK, 2020).

[5] The Land Forces Command was established on February 17, 2006. In 2016, the Land Forces Command was abolished and by order of the President of Georgia (Supreme Commander-in-Chief) №1 of March 4, 2016, two commands were approved - the Eastern Command of the Land Forces and the Western Command of the Land Forces.

Available at https://mod.gov.ge/ge/news/read/7233/tavdacvis-dzalebshi-agmosavlet-da-dasavlet-sardlobebis-daarsebis-dge-agnishnes

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GEORGIAN EXPERIENCE OF DEVELOPING CYBER CAPABILITIES IN THE DEFENCE FIELD

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Large-scale attacks from 2008 and 2011 against Georgia further emphasized the necessity of implementing law on information security and founding cyber actors in the country. Announcing cyber security as a challenge of collective defence and recognizing the ultimate importance of the providing proper cyber security in the defence field, Georgia started developing its cyber capabilities in the sector in early 2014, through its LEPL Cyber Security Bureau. This article will review 8-year experience of Georgia, describe the deterrent issues in this process and bring information regarding the successful steps, which deserve to be noticed.

Key words: cyber capabilities, cyber defence, Georgian experience, cyber strategy, cyber security, defence sector

1. INTRODUCTION

Current Russian-Ukrainian war, along with those others of the late 20th and 21st century proved that conflicts no longer take place only in conventional way and malicious activities are noticed in the cyber space, making protection of information infrastructure inevitable for the states.

Critical infrastructure (CI) protection requires adequate planning and approach. The states usually divide certain categories of CI in order to be able to take steps that are tailored to this part of infrastructure. Usually these are: security, energy, finance, defence, education, etc.

What's more, defence sector is even more significant in this regard, as it is the basis of the national security and warranty for the public order.

The aforementioned was proved back early in 2002 on NATO Prague summit, noting that the alliance should strengthen its capabilities to defend against cyber attacks. This was followed by first cyber attacks in the world directly against the states, specifically against Estonia and Georgia, making this an alarming signal, that in parallel to the military actions, conflict would also move to cyber space in case of any crisis in any part of the world.

The abovementioned was proved by nearly all conflicts that occurred in the world later on.

Georgia started building its cyber capabilities with the Georgian law on Information Security and decided to implement cyber policy based on whole of government approach to provide cyber security in the country. There are overall 6 bodies working in the cyber sphere in Georgia. These are:

document is to strengthen cyber capacity and capability of country. The document addresses wide range of subjects such as: Information sharing. exercises and trainings, Public Private Partnership (PPP) and many more.

2. GEORGIAN CYBER DEFENCE

It does not come as a news that defence field distinguishes from other sectors and requires different

Fig. 1 Georgian Cyber Actors

Among these 6 bodies, the information is being shared constantly and this approach also involves cooperation through joint exercises, trainings and forums, which are held in order to reach success in the cyber sphere in the whole country.

In order to strengthen governing process and to plan strategic cyber directions of the country, the National Cyber Security Strategy 2021-2024 was approved by the Government of Georgia. The aim of this conceptual

approach and management. Due to various reasons, starting with different architecture and finishing with personnel, military institutions are subject to specific cyber threats and it is totally impossible to manage cyber threats in defence via centralized approach and/or governmental CERT. Therefore, for the security of military and non-military infrastructure protection of solely this field, bureau started to take actions.

Based on the law on Information Security, in February 2014, sectorial cyber actor was founded – Cyber Security Bureau of the Ministry of Defence of Georgia.

Cyber Security Bureau (CSB) of the defence Ministry is solidly represented in the above mentioned documents of law and strategy and, side by side, with the other national cyber actors, strengthens cyber resiliency of the state.

More than 8-year period does hold substantial information about the steps that were taken to build cyber capabilities in the defense field through human capital, assistance of partners and technical sustainability development. The main chapter will bring specific information on the steps taken and draw emphasis on the challenges Georgia ran into and currently faces up to.

The aims of CSB are the following:

1. Ensure cyber security in the national defense field;

2. Manage cyber attacks and computer incidents against information security in the defense field;

3. Determine information security policy and facilitating its implementation in the defense field;

4. Draft and perfect legislation regulating cyber sphere.

It should be noted that unlike other issues, cyber security unfortunately cannot be addressed through responsive mechanisms. More emphasis is drawn on proactive steps, as our main goal should be prevention of malicious activities. In case the perpetrator steals our military intelligence data, anybody would agree with us, that reactive mechanisms will not be able to minimize such result. Like in any other part of the developed world, minor cyber incidents do take place from time to time, however, prevention of damaging actions is thanks to the efforts that aim to stay resilient to the threats in the cyber space.

Cyber Security Bureau took various steps, which gained positive feedback both from Georgian and foreign experts and field specialists. I will present several examples for the reader.

2.1. Cyber defence strategy

Sectorial strategy is one of the topics, which gained positive feedback from foreign experts. Georgia had its first defence cyber security strategy back in 2014, when the Bureau was founded. The latest edition of this documents is of 2021-2024. The benefits of such paper is that it gives the unique opportunity to be specific, linked to cyber defence challenges, which compromises action plan, indicators of performance and most importantly, the ability to plan properly and execute in the correct way. Having no sectorial

strategy is the same as sailing in the ocean without compass. The Defence Cyber Security has 3 critical directions:

1. Human Capital Development;
2. Institutionalize processes and increase management efficiency;
3. Ensuring technological sustainability.

The aforementioned document is written in compliance with the national cyber security strategy, is also accompanied with its action plan, giving the sector opportunity to know where we are, what are we lacking, what are our next steps, when do we have certain deadlines and how are we assessing the results. Currently, defence sector is the only one in Georgia that shares this attitude of adopting specific strategic document, while various countries do already have such experience: Belgium that has "Cyber Strategy for Defence", Netherlands with "Defence Cyber Strategy: Investing in digital military capability", the United Kingdom with "Cyber Resilience Strategy for Defence", France with "Cyber Defence Policy" and Luxembourg and Czech Republic with Cyber Defence Strategy.

2.2. Cyber reserve

By 2014, when several countries managed to start implementing such programme, ministry of Defence initiated Cyber Reserve project. The benefits of the programme is well-known for everyone, however, it also acted as an assistance for employing qualified personnel in the defence field, which was one of effective solutions to lack of personnel. This project has long-term benefits of having qualified cyber security specialists, ready to help the state in case of war and crisis. The reserve specialists are involved in projects, training programmes and cyber exercises organized for and by Cyber Security Bureau of MoD. In order to further strengthen the project, it is currently under institutional development.

2.3. Education

Military personnel, as end-point users, are frequently used to attack the defence sector worldwide, which further emphasizes vital importance of cyber security awareness.

Defence sector faces the highest risks of cyber espionage and cyber sabotage. Cyber sabotage can be prevented via technical solutions and preventive mechanisms, while espionage, usually deployed via spyware malicious software, requires high awareness levels from the end-user side.

Due to the high number of military and non-military personnel, trainings cannot work as an only way to raise the awareness. Therefore, multiple methods have been used to address the issue, specifically:

1. Organising cyber hygiene courses tailored to the audience, which covers the topics, including practical advice regarding: malicious software and its types, social engineering, phishing attacks, web and e-mail security, smartphone and social media issues, data protection importance and tools, etc;

2. Developing and simultaneously updating distance course of Cyber Hygiene on MoD e-learning portal. This course was made mandatory for all newly-appointed staff in the defence system;

3. Organising phishing campaigns and training programmes according to their results;

4. Handing out and publishing informative leaflets and handbooks regarding cyber hygiene;

5. Sending information regarding practical measures and current cyber threats (f.e. information about currently spread phishing campaign, two-factor authentication activation instruction on a specific platform, etc.);

6. Issuing monthly "cyber digests" focusing on the latest information regarding the news and major malicious activities in the cyber space.

What's more, cyber security is one of the key components in any military and inter-agency exercises, such as Maple Arch, NATO-GEO and Didgori - the largest-scale exercise in Georgia, taking place once every two years.

2.4. International cooperation

Georgia would not manage to properly secure its defence infrastructure without international cooperation. Cooperation platforms exist as of bilateral and multilateral format, as well as with NATO and EU institutions. Thanks to the international partners, defence cyber actor of Georgia participates in the following international cyber exercises and programmes:

1. NATO OCCE&F;
2. NATO CWIX22;
3. NATO MISP;
4. Regional Cyber Defense Center, as a large-scale OSINT sharing international project, involving the USA, Gorgia, Ukraine and Lithuania;
5. EU Projects: EU4Digital, the Common Security and Defence Policy (CSDP), EU Twinning, EU Safe;
6. Educational courses offered by Romanian Dresmara;
7. Amber Mist organised by Lithuanian Armed Forces;
8. Cyber Dawg hosted by US Georgia state;

9. Locked Shields and Cyber Coalition by NATO;
10. Paintball organized by USA Michigan state National Guard and many more.

Georgia also hosts the annual cyber security event – Intermarium Cyber Security Forum, where key cyber security topics, such as: hybrid challenges, modern trends in cyber space, defence strategies are discussed by local and international invited specialists and experts of this field.

2.5. Challenges and way forward

Specificity of cyber sphere makes infrastructure protection never fully adequate to the current and evolving threats. The states have responsibility to develop cyber capabilities that will battle with various, even unpredicted vectors of compromise.

Defence sector is even more complex due to its large scale and cyber threats existing worldwide. CSB and Mod, in order to provide adequate response to these threats and mitigate the risks, conduct audit and intermittent assessments which give the opportunity to deal with the vulnerabilities, as a matter of prevention, rather than dealing with malicious results post-factum.

Another major challenge faces is education. Georgia still lacks the opportunity of cyber security academic education as bachelor and master's programmes. David Aghmashenebeli National Defence Academy of Georgia implemented study discipline of cyber security, which gives the country unique chance to help young people with patriotic spirit, who decided to gain education in the military institution, be trained and become qualified cyber professionals.

Currently, along further deepening all the steps described in the previous parts of the paper, 4 major projects are planned to strengthen defence sector resilience of Georgia:

1. Cyber Security Laboratory - which will increase the digital forensic capabilities, staff will be retrained and qualification upgraded, will be introduced new software solutions that will allow faster and more detailed processing of computer security incidents.
2. Cyber Range – platform which allows, based on various simulation scenarios, to conduct cyber training for different purposes. The platform is widely used by NATO Allies as one of the most effective means to increase and strengthen the capabilities of the cyber defense operations team.
3. Cyber Security Operations Center (CSOC) of modern standards - which will be staffed with information and cyber security analysts, engineers and managers who will monitor the ongoing

processes in the network of the Ministry of Defence from a technically and software-equipped situational room. The main feature of the center is the highest level of confidentiality and on 24/7 basis identification, analysis and response to cyber security incidents. In a close cooperation with strategic partners, a new office of the CSB will be built and CSOC will be stationed there.

4. Cyber Command – while the process is a long-term, various steps have already been taken to consolidate the key elements necessary to provide coordinated and adequate response to cyber threats, including cyber security, network operations and IT services.

Being able to hold an interview with the Director of Cyber Security Bureau, as the lead of cyber defence of the state, Luka Mgeladze points out 3 most successful steps/facts in the Georgian cyber defence, specifically:

1. International cooperation, thanks to which Defence sector improves its networking, gets the opportunity to develop human capital and gains financial resources;

2. Assisting the process of defining cyber security as a priority for defence leadership, giving the opportunity to present relevant solutions, proceed reforms and make structural changes;

3. Current team of CSB – as recruiting and training competent human resources is a key priority for the sector and the field.

Mr. Mgeladze also mentioned that currently defence sector of Georgia faces the following challenges:

1. Human resources outflow – the demand for information security staff rises in both public and private sector, where private organisations have better flexibility and opportunity to offer higher salaries, making this one of the challenges nowadays;

2. Emerging cyber threats, which is a permanent threat especially for Georgia, due to the existence of hostile attitude from the perpetrator, which had malicious actions several times against the country in the past;

3. Cyber security awareness, due to the fact that end-users are always at the front of the line in the cyber space, where even minor mistakes can lead to the terrible consequences, such as data loss, espionage, etc.

2.6. NATO and Georgian Cyber Defence

When developing cyber capabilities in the security and/or defence field in Georgia, as a country striving for Euro-Atlantic integration, NATO attitude should be shared and supported.

Georgia's national security is a constituent part of the global security architecture and change in the latter's security does reflect on our security as well. In the nearest future, there could be epochal change in the global security system under the influence of cyber sphere. This regards to the NATO's Article 5 covering Cyber Attacks.

Article 5 of NATO's charter has existed since 1949, and it is popularly defined as "one for all, all for one". The article reads:

The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them.

Article 5 has only been addressed once in the history of the alliance, in response to the terrorist attacks on the World Trade Center and the Pentagon on September 11, 2001.

In 2010, a group of NATO experts, led by the former US Secretary of State, Madeleine Jana Korbel Albright, came to the conclusion that a significant cyber attack on the critical infrastructure of the Alliance countries can be classified as an armed attack and retaliatory actions by military means should be justified. Based on the group's assessments, the 2010 Lisbon summit adopted NATO's first strategic concept of the 21st century, which identified cyber attack as a major threat that could reach such a scale as to threaten Euro-Atlantic security and stability. In 2016, NATO Secretary General Jans Stoltenberg declared cyberspace as a full-fledged operational environment and did not rule out the activation of Article 5 of the Alliance Charter in the event of a devastating cyber attack on any of the member states. According to the General Secretary, paragraph 5 will not be implemented automatically. Everything will depend on the results of the cyber attack and the decision will be made on a case-by-case basis.

Dissatisfaction with Russia's unappealable actions, the victim of which Georgia became multiple times, in the cyber space has also increased in the EU countries. In May 2019, the European Council approved a package of measures to be implemented in response to cyber-attacks, or even attempted cyber-attacks, against member states.

In this direction, the years 2020-2021 were important, when the cyber attacks of an unprecedented scale by Chinese and especially Russian hacking groups against American critical infrastructure facilities created significant challenges for American national security and economic stability. It got to the point that on June 16, 2021, at the Biden-Putin meeting in Geneva, the Russian president was given a list of critical American infrastructure (16 sectors), against which cyber attacks will be considered a red line.

The Secretary General of NATO said in a speech at the headquarters of the "Atlantic Council" in Washington, that the alliance should not distinguish a cyber attack from other types of attacks and should determine the threshold value of the consequences of a cyber attack, after which Article 5 will be triggered. The speech of the Secretary General took place before the summit held in Brussels on June 14, 2021 and can be considered as a signal sent to the legislators of the member states - to seriously start discussing the mentioned issue in the legislative bodies.

The dynamics of the development of events show that in the coming years, the amendment to Article 5 of the NATO Charter will be made, which will be a historic event in strengthening global security. It is natural that the mentioned change will affect Georgia as well.

Georgian defence sector puts all the possible efforts to follow the pace of this development and it is highly likely, that even in case of not yet being a NATO-member state, the state will follow the alliance decisions and take all the steps the alliance countries do.

3. CONCLUSION

Georgian experience of developing cyber capabilities should be taken into consideration, as it started with being one of the first states to be attacked and saw

multiple attempts of compromise. However, the statistics hardly presents successful attacks solely in the defence field since 2014. Human resources efforts and implemented technical tools through the vast and honest assistance of international partners, did block various potentially malicious activities. Strong international cooperation allows the country to share experience regarding the cyber issues and be part of international cyber community, which is unprecedentedly valuable.

However, the aforementioned solutions may be relevant today. As cyber threats are continuously emerging and cyber offensive capabilities of perpetrators do really rise in fast pace, there is an emphasized necessity to be qualified, flexible and innovative.

Cyber security is a crucial part of collective defense and cyber actor in any country should be representing military sector which will make all the necessary efforts for its proper development. In this process, similar to Georgian example, it is vitally important and ultimately useful to draft sectorial orientation documents, have tight cooperation with Western partners and stay awake to be innovative.

4. ACKNOWLEDGMENT

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SOCIAL MEDIA, PUBLIC OPINION, AND RESOURCE IMPLICATIONS FOR THE UNITED STATES AIR FORCE

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Social media has become a powerful force. t exerts influence by shaping the public's perceptions of various issues, including defense related topics. Public opinion, in turn, has effects on war, military policies, and budgets. Thus, understanding the public discourse and associated sentiment on defense related issues and identifying the influencers in social media is important. Techniques such as text mining are a relatively inexpensive and efficient means to achieving these objectives. This study employs these techniques to empirically analyze Twitter references to the United States Air Force (USAF) over a seven month period and provide recommendations for potential changes to current USAF social media operations.

Key Words: *public affairs, social media, defense budgets, resource allocation, influencers, text mining, sentiment analysis*

INTRODUCTION

Social media has become a powerful force that not only affects the private sector, but also public sector entities such as the United States Air Force. One way social media exerts influence is by shaping the public's perceptions of various topics. Public opinion, in turn, has profound effects. In fact, research on public opinion has found the American public's views of the Department of Defense have tangible impacts on defense spending (Hartley and Russett, 1992) and support for war (Page and Shapiro, 1983). Thus, this article explores the current dynamics of Air Force social media sentiment through textual analysis of *Twitter* data over a seven month period. The analysis focuses on two areas: 1) *Twitter* references relevant to

general Air Force searches and 2) specific *Twitter* references to the five primary "strategic vectors" (hereafter, "mission areas") as detailed in the United States Air Force Strategic Master Plan [AFSMP] (Secretary of the Air Force, 2015). From this, recommendations for improvement are provided.

1.1. The Growth of Social Media

Social media in the early 2000s pursued a simple goal of connecting people through the internet. *Myspace*, once the most popular website in the world, was one of the first to enter the uncharted waters of social media networking. On *Myspace*, individuals could play a song over their profile page or alter the ranking of their top friends list; all revolutionary activities at the time. As a tool to simply interact with one another through music and entertainment, *Myspace* was excellent. Nevertheless, social media today has evolved to be much more. Current generation platforms such as *Twitter*, *Facebook*, and *Snapchat* have grown to be highly functional resources for news and user opinions on various matters.

Fifteen years ago, it would have been difficult to comprehend the dominance that social media has in the news domain over competing sources such as newspaper and radio. According to the Pew Research Center, two-thirds of Americans report that they get at least some of their news on social media, while at the same time nearly 50 percent of people under the age of 50 have online sources as their primary news outlet (Mitchell et al., 2016). This impact is magnified as social media promotes human opinion more effectively than other avenues through sharing and promotional actions like *retweets* and *shares* (Bruns and Burgess, 2011). In fact, in just **one minute**, an average of 900,000 users logged into *Facebook*, 46,200 pictures were uploaded to *Instagram* feeds, and 452,000 *Twitter* tweets were posted (Desjardins, 2017).

Although using social media to promote social change is unique to the digital era, the underlying principle behind *gathering* and *associating* toward common goals is a fundamentally democratic activity. French aristocrat, Alexis de Tocqueville, recognized American democracy and its ability to gather and promote change.

Americans of all ages, all conditions, and all minds are constantly joining together in groups… Wherever there is a new undertaking, at the head of which you would expect to see in France the government and in England some great lord, in the United States you are sure to find an association. In America I came across types of associations which I confess I had no idea existed, and I frequently admired

the boundless skill of Americans in setting large numbers of people a common goal and inducing them to strive toward that goal voluntarily (De Tocqueville, 1835).

The common way to associate in the days of Tocqueville was through a town-hall. Today, the internet and social media makes it easier to associate with the potential to reach millions in a short time by going "viral." This association has implications for the Air Force, with the potential for social media to have an effect along many dimensions including budgets and public support for military intervention (Page and Shapiro, 1983; Hartley and Russett, 1992). Therefore, it is critical to analyze the sentiment of the American public along with the views of influential persons, labeled as *influencers* in this paper, as they impact elected official's actions in the military arena.

1.2. Opinion Formation

Humans are not born with innate opinions on the world around them. [1] Inherently, this means that humans have no preconceived stance on matters of defense such as military spending or troop levels. Rather, opinions are formed over time through *social influences* and *interactions* with other people (Moussaïd et al., 2013).

The opinions of others greatly affects how we form our opinions. In social environments, people tend to filter and integrate information they receive and revise their own beliefs accordingly (Moussaïd et al., 2013). This is especially true in the digital era, where any place with a Wi-Fi signal can transform from a solitary to a social environment. Additionally, *other people* are not always weighted equally in terms of influencing one's opinion (Watts and Dodds, 2007). According to the Influence Model developed by Katz, Lazarsfeld and Roper (2017), interpersonal interaction has a far stronger effect on shaping public opinion than mass media outlets. Their model demonstrates that a small minority of "stars" act as intermediaries between media and society. They find the direct exchange of information from the media to "non-stars" does not guarantee that there will be an opinion change. Rather, these "stars" or *influencers* act as trusted advisors between the two parties which help facilitate modifications to an opinion (Watts and Dodds, 2007). See Figure 1 for our version of a social media "stars" influence model.

War is a controversial topic that is often debated in the media. Research has found that people will initially develop their opinion on war through a cost-benefit analysis of factors such as lives lost, financial cost, or perhaps probability of winning the war (Kim, 2014). However, additional research shows that the
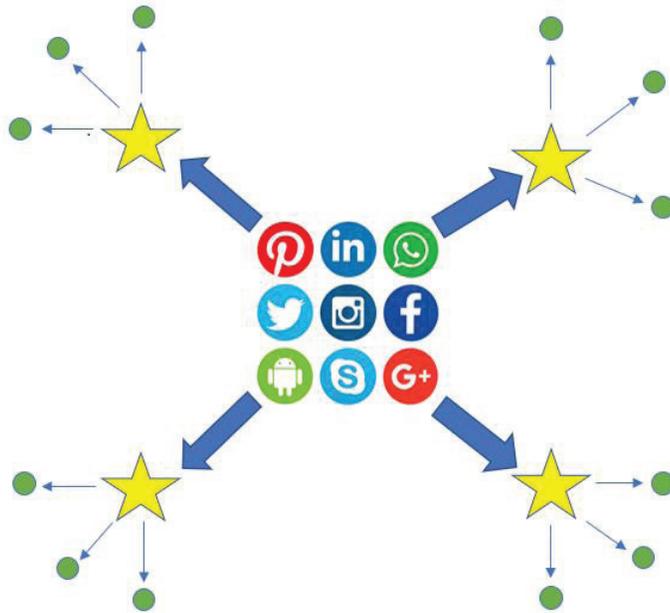
Fig. 1 Social-Media Stars Model of Influence

"star" factor plays a large role in this debate as well. Berninsky (2007) demonstrates that "elites" (analogous to "stars") and the agreement or disagreement among other elites is the most influential factor in determining an individual's opinion on war. Berninsky (2007) found that non-stars were more likely to support war if elites were in agreement to support. The terms "stars" and the "elites" are synonymous with the concept of *influencers* in this paper. The effect that *influencers* have on society is amplified through social media. By understanding the voice of various groups of influencers and non-influencers, one can determine if the same intermediary influence is present in the digital age.

2. CULTURAL CHANGE AND AIR FORCE SOCIAL MEDIA

The military in general reacts to sociocultural change with careful deliberation. For instance, the Air Force tattoo policy has been historically restrictive. Before the policy change in February of 2017, Airmen were not allowed to have a tattoo on their chest, back, arms and legs that was larger than 25 percent of the exposed body part. But due to increased social acceptance for tattoos outside of the military along with a need to "access more talent and retain qualified Airmen," the Air Force adapted to sociocultural change and relaxed its policies against tattoos (Secretary of the Air Force Public Affairs, 2017).

The Army was the first U.S. military branch to implement the change. Army Chief of Staff, General Ray Odierno broke the news during his address at the Association of the U.S. Army Conference in 2015. "Society is changing its views on tattoos, and we have to change along with that… It makes sense, soldiers have grown up in an era when tattoos are much more acceptable and we have to change along with that" (Curthoys and Tan, 2015). The policy change was a milestone for both the Army and Air Force and demonstrates that the military can culturally transform. The same type of change may be needed for social media analytics to be embraced as a desired strategy to enhance the Air Force's cyber capabilities.

Currently, the Air Force has limited engagement in the field of social media analytics. The Air Force's uses of social media is constrained due to the amount of time and effort that is required to analyze such large amounts of information. "There's a significant amount of that data that we collect that hits the floor and we never actually look at it because we don't have the analytical capacity," said Air Force Chief of Staff General Goldfein at a 2017 Air Force Association event in Washington, DC (Harper, 2017). That data is not coming from sources and methods that need protection. Rather, "it's coming from social media and it's coming at a speed that's actually faster than sometimes we can get from our exquisite intelligence-collection capabilities" (Harper, 2017).

Presently, the Air Force utilizes social media in two primary efforts. First, the Air Force uses a variety of social media platforms to communicate. *Instagram, Facebook, Flickr, Twitter, YouTube,* and the *Air Force Live Blog* are all platforms associated with an official Air Force account which is managed by the Air Force Public Affairs Agency (AFPAA). The Air Force Social Media Guide (AFSMG) defines the benefits and security concerns stemming from social media networking. This guidance, which is authored by the AFPAA, makes it clear that the role that social media plays in the Air Force is for communication, both internally and externally. "Social media not only serves as a way to communicate internally with our Airmen, but also as a means to tell the story of our Airmen to external audiences who themselves are actively engaged in social networks" (Air Force Public Affairs Agency, 2013). Although social media serves as an excellent outward communication tool, the necessary capabilities to analyze social media data is not present in the mission scope of the AFPAA.

Second, the Air Force uses social media to gather intelligence on

enemy activity. At the aforementioned Air Force Association event, General Goldfein discussed the efforts of intelligence Airmen that found the group responsible for shooting down a Malaysian commercial flight in 2014. "We were searching for the smoking gun and we found it a month later on *Facebook* when we found posted pictures on Russian blog sites that actually showed the activity" (Harper, 2017). Similar to mistakes on the battlefield, mistakes can be made by the enemy on social media, and as shown here, the Air Force exploited it. In a similar story, General "Hawk" Carlisle, Air Combat Command commander, provides an example of another intelligence gathering effort through social media. This time, a mistake was made by an ISIL soldier whose on-line post gave away the location of an Islamic State headquarters building. "So they [intelligence airmen] do some work, long story short, about 22 hours later through that very building, three JDAMS take that entire building out" (Everstine, 2015). These stories show the powerful role that social media can play when resources are allocated to analyze social media information for a specific purpose. Although social media analysis has proven exceptionally effective for the intelligence community, this remains only a fraction of its power.

This paper proposes that a third approach may be appropriate.

The approach, to be discussed more fully in subsequent sections, utilizes textual analysis (i.e. Text Mining) techniques to examine the sentiment of the public regarding Air Force references in social media. The literature shows that social media analysis has become an important proxy for public opinion, originating the field known as Online Reputation Monitoring (Dos Santos Saleiro da Cruz, 2017). Text mining, in turn, is playing a key enabling role in deriving high-quality information from online textual content about private companies' reputations (Amigó et al., 2013). Shifting this private sector application to analysis of the public sector is straightforward. Thus, understanding sentiment on Air Force related issues along with identification of *influencers* in the social media realm is crucial to diagnosing public opinion. Public opinion, in turn, affects war, military policy and military budgets.

2.1 Brand Management

The Air Force is a brand and its missions as outlined in the AFSMP are its products to the American taxpayer. With that comes the responsibility for the Air Force to analyze and interpret what the American public is saying about it. Tim Weber, editor from British Broadcasting Company (BBC) says it best, "these days, one witty tweet, one clever blog post, one devastating video-forwarded to hundreds of friends at the click of a mouse-

can snowball and kill a product or damage a company's share price" (Weber, 2010). To counter "these days," as discussed by Weber, private sector companies are now investing resources in social media analytics to avoid these misfortunes, while concurrently gathering information on customer values. "Social media analytics provides businesses with insights into customer values, opinions, sentiments and perspectives on brands" (Kurniawati et al., 2013).

Although the nature of the Air Force is different from private companies, much can be learned through private sector examples of brand management. As Tocqueville explains, Americans voluntarily *associate* in order to drive social change. In the digital era, the primary venue for *association* is through social media. Thus, a lack of understanding public sentiment is particularly problematic for public entities such as the Air Force, as Page and Shapiro (1983) find that public opinion is often a proximate cause of policy. Neglect, ambivalence, or standing on the sidelines in the social media realm may lead to inefficient or undesirable policies regarding military affairs.

3. EXAMING AIR FORCE REFERENCES IN SOCIAL MEDIA

This analysis is scoped as an exploratory empirical examination utilizing textual analysis of United States Air Force references in *Twitter*. Prior to analysis, tweets [3] were collected through a meticulous process. Over a seven month period, tweets were gathered using searches referencing 1) the general Air Force, such as "USAF" or "United States Air Force" and 2) the five United States Air Force mission areas that encapsulate Air Force service. These five mission areas were not subjectively determined, rather, they were referenced from the Air Force Strategic Master Plan (Secretary of the Air Force, 2015). The AFSMP is official guidance published by Air Force leaders in 2015 that outlines the Air Force Strategy from present time until the year 2030. At the core of the plan are the five primary mission areas that the Air Force intends to focus on:

I. (Nuclear Deterrence) Provide Effective 21st-Century Deterrence

II. (Intelligence, Surveillance, and Reconnaissance) The Air Force will employ agile multi-domain solutions to detect, characterize, deter, and defeat adversaries

III. (Air Superiority) The Air Force must focus on the skills and capabilities that deliver freedom of maneuver and allow decisive action in highly-contested spaces

IV. (Space and Cyberspace) To achieve the most effective solutions across the spectrum of military operations, we will increasingly integrate and employ capabilities operating in or through the cyberspace and space domains

V.   (Maintain   Technological Dominance) We must continue to pursue radical improvements in technology (Secretary of the Air Force, 2015)

Focusing the *Twitter* searches on these five mission areas was intended to capture the public perception on how well the Air Force is doing at serving the American people. In addition to mission area searches, each tweet was sorted into different *user groups* to determine who the key *influencers* are within Air Force social media.

Once the data was collected, multiple Text Mining approaches were used to find characteristics and trends among the collection of tweets. An initial dataset exploration was conducted through word frequency analysis. The 50 most used words is portrayed in the Word Cloud in Figure 2, which exhibits frequency through font size and color. Although a word like "military" is not surprising to see as the most frequent word, "kc" (short for KC-46) was not anticipated to be the second most frequent. For this reason, further investigation of tweets mentioning the KC-46 was desired to determine public perception of the widely discussed refueler. Results of the KC-46 analysis will be discussed in a subsequent section.

3.1 Sentiment Analysis

While word frequency provides useful information, the primary Text Mining method used in this research is sentiment analysis. Sentiment

Fig. 2 Frequency Word Cloud (All Data)

analysis utilizes dictionaries of words known as *lexicons* to draw out the overall meaning and emotion behind each tweet. The three lexicons used (NRC, BING, and AFINN) [3] assign sentiment scores to individual words on a negative to positive scale, which can be summed and developed into an overall score for a sentence, tweet, mission area, or user group depending on the intent of the analysis. The NRC and BING lexicons assign sentiment scores on a -1 to 1 scale, with NRC enabling additional analysis capability by sorting each word into one of eight emotions (anger, anticipation,

than the NRC or BING lexicons.

Sentiment analysis was first conducted on the data as a whole using the NRC lexicon, which can be seen in Figure 3. As exhibited in the far right bars, positive words outpaced negative words by 681, indicating that the collection of tweets were primarily of positive sentiment. In addition, "trust" and "fear" had the highest word count within the emotional categories.

Sentiment results in Figure 3 provides summary level insight on what can be expected in the dataset. To garner more insight, sentiment analysis was conducted on various subsets of the data. The first subset
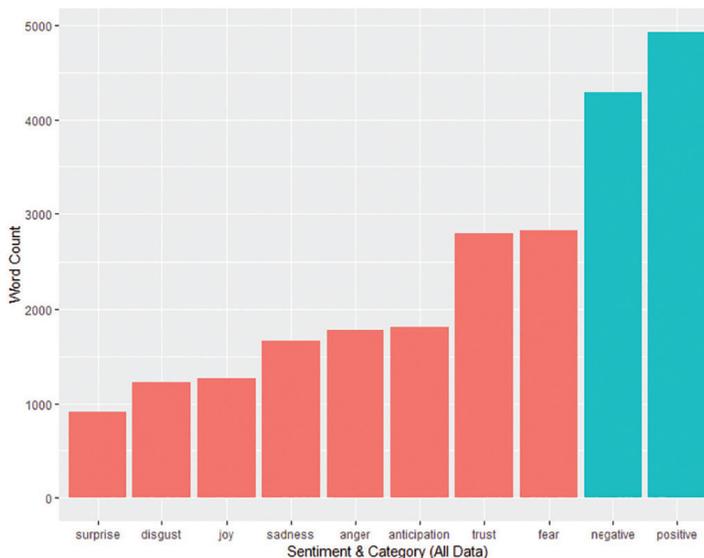
Fig. 3 NRC Sentiment Analysis (All Tweets)

disgust, fear, joy, sadness, surprise and trust). The third lexicon, AFINN, assigns sentiment scores on a -5 to 5 scale which enables greater insight into the intensity of the sentiment

includes tweets sorted by mission using the BING lexicon (-1 to 1). As exhibited in Figure 4, the *Technology* mission was extremely positive, the *Air Superiority* mission was the only
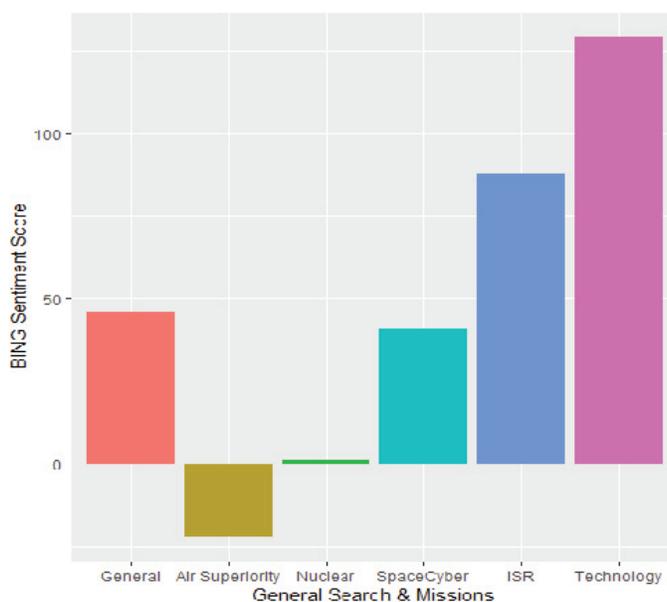
Fig. 4 BING Residual Sentiment (By Mission)

negative, and the *Nuclear Deterrence* mission was near neutral sentiment.

As the lone mission to receive more negative than positive sentiment, further investigation was warranted into tweets referencing Air Superiority. To examine, sentiment analysis using the same NRC approach from Figure 3 was conducted solely on Air Superiority tweets. Figure 5 displays a comparison of the NRC results with Air Superiority shown on the top and All tweets shown on the bottom. As exhibited, a shift in overall sentiment occurs in the Air Superiority tweets, which is consistent with the BING sentiment results found in Figure 4. In addition, the Air Superiority category dominates negative emotional categories with a majority of the words in "disgust" (97.8%), "sadness" (73.5%), "anger" (65.7%) and "fear" (56.8%) from the full dataset attributed solely to this category. Lastly, an astounding 77.8% of *all* negative words were found in tweets referencing this mission area.

Having an understanding of Air Superiority sentiment is a crucial component, but provides limited insight without knowing the entities or "nouns/pronouns" that the sentiment is describing. To provide more context to the sentiment analysis, the top Bi-grams (pairs of words) used in Air Superiority tweets were listed and visualized in the Bi-gram map found in Figure 6. As exhibited, many of the Bi-grams include recently acquisitioned aircraft
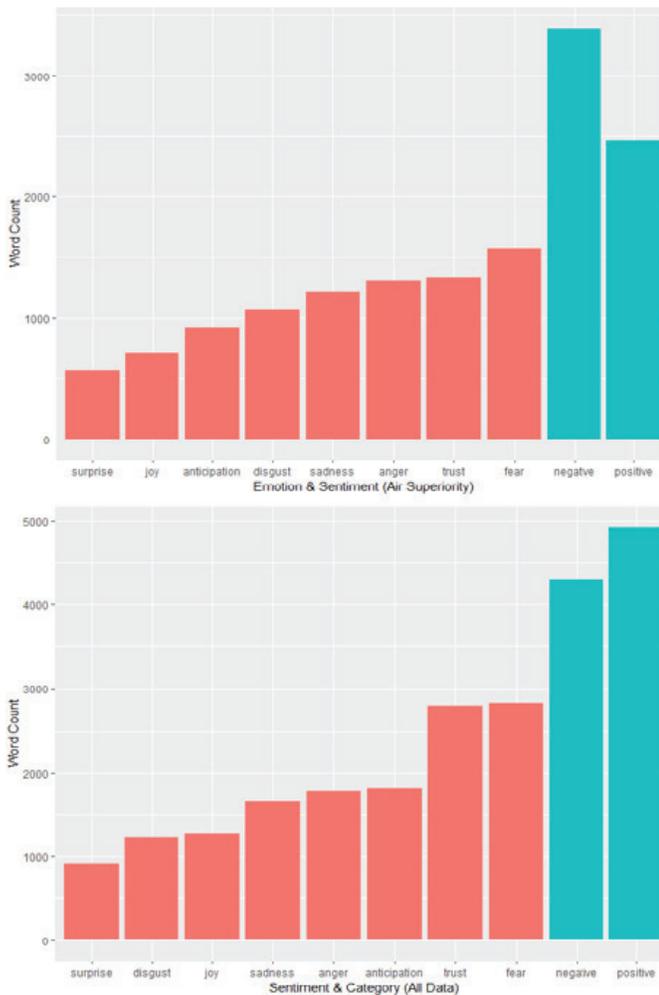
Fig. 5 NRC Sentiment Air Superiority (top) vs. All Tweets (bottom)

such as the KC-46, F-22, and F-35. A deep-dive on these aircraft platforms revealed that negative sentiment was primarily associated with tweets discussing F-35 spending, blocking the sale of F-35s to Turkey, and KC-46 delivery delays.

Figures 2 and 6 highlight the KC-46 as a highly discussed topic within the data. To expand on this knowledge, sentiment analysis of KC-46 tweets was conducted to determine the type of sentiment being displayed by different types of *users*. Each tweet was assigned to a *user group* based on their *Twitter* profile. A complete list of user groups and the criteria for inclusion in each group is listed below:
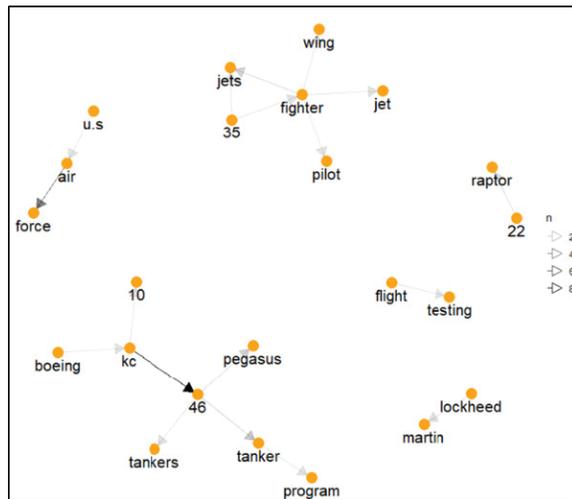
Fig. 6 Most Used Bi-grams (Air Superiority)

- *Bloggers* – fan pages, satirical pages, aircraft monitoring pages, self-identified blogger
- *Celebrities* – authors, athletes, actors/actresses, TV personalities
- *Military Leaders* – official military pages, SES, 0-6 and higher, CMSgts
- *News/Press* – agencies, magazines, individual journalists/reporters
- *Organizations (Professional)* – companies, schools/universities, sports franchises,
- *Politicians* – mayor, governor, city councilmen, congressmen
- *Regular Users* – unverified, usually a person's name.

Figure 7 displays the results using a mean AFINN sentiment score (average sentiment per word) for the

KC-46 tweets by user group (note that the user group *Celebrity* did not have any KC-46 affiliated tweets). The graph illustrates that the *Military, Politician,* and *Organizations* user groups all have a mean sentiment score greater than one, indicating that these are the most positive users discussing the KC-46 and its current acquisition status. The results are logical as military and politically affiliated *Twitter* accounts desire for the American taxpayer to relish the acquisition of the KC-46, while defense industry companies, which are a large subset of *Organizations* in this instance, promote their products in a positive light. The fact that no user group has a negative sentiment relating to the KC-46 may seem contradictory to the finding in the Air Superiority mission area, which included the KC-46. owever, recall

that AFINN sentiment analysis is designed to measure the *intensity* of the sentiment, rather than just the raw sentiment numbers. Therefore, while the KC-46 received its share of criticism relating to delivery delays, the anticipation for the modern refueler's capability outweighed the voice of its critics.

the amount of influence that each user group carries is the most important factor when characterizing key players within Air Force social media. Who are the influencers for the Air Force? Influence can be defined in a number of ways. In this analysis, influence (for a tweet) is defined as the sum of *engagements* (favorites
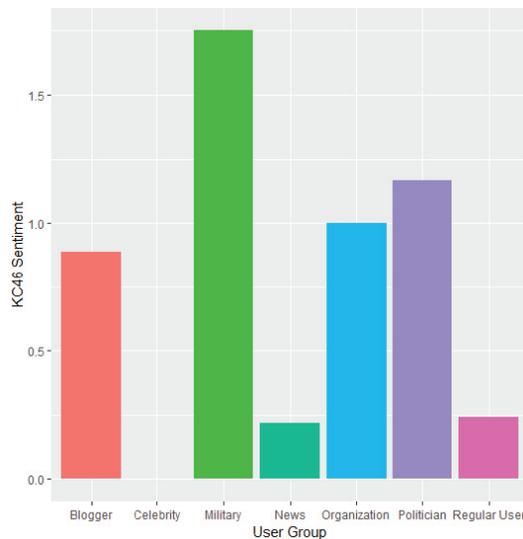
Fig. 7 KC-46 Sentiment (By User)

3.2 Influence

Recall that opinions are formed over time through *social influences* and *interactions* with other people (Moussaïd et al., 2013). As previously discussed with the Model of Influence in Figure 1, direct exchange of information from media to "non-stars" does not necessarily result in opinion change. Rather "stars" or "influencers" act as trusted advisors that facilitate modifications of opinions or sentiment. Therefore,

+ retweets + replies) divided by the number of followers that the author of the tweet possesses. The score is then aggregated with other tweets within the respective user group to calculate an average influence for each group.

The results are illustrated in Figure 8, which provide average influence scores by user group. Note that the *Regular Users* group is excluded from this part of the analysis due to their extremely low follower

counts that bias (overstate) influence. As exhibited, *Bloggers* hold by far the most influence within the data. They are the "stars" of this analysis. In other words, *Bloggers* are shown to be the most effective intermediaries between posted content and their followers. When it comes to shaping public opinion on Air Force matters, *Bloggers* are highly influential. In addition, the influence of the *News/ Press* user group is impressive. That group holds the second highest average influence, while combating extremely high follower counts that diminish their influence score.

Tocqueville's art of association. As a result, public opinion is undoubtedly shaped through this modern medium. Given what is known from prior research on the impact public opinion has on war, military policy and budgets, it is critical for the Air Force to be aware of relevant social media topics and sentiment and in some cases respond. For example, American military procurement has been portrayed as a poster-child of waste and incompetence, perhaps most infamously from the alleged purchase of $400 hammers in the 1980s (Freedberg, 1998).
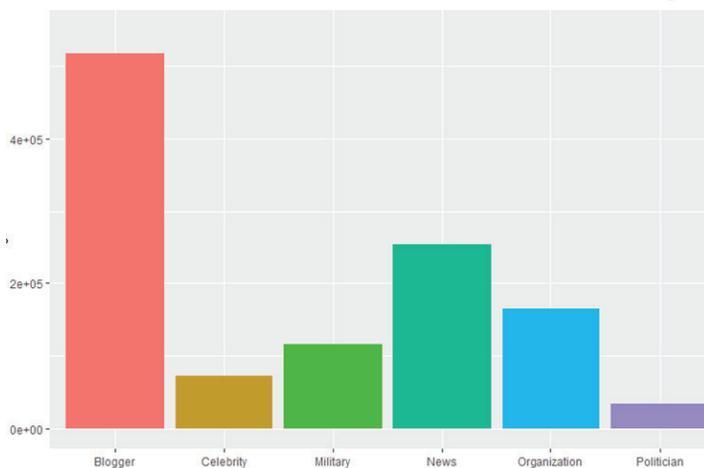
Fig. 8 Average Influence of User Groups

4. DISCUSSION

The prevalence of social media in society today is apparent. Who doesn't have or know someone with a *Twitter*, *Facebook*, *Instagram*, or other social media account? Social media has therefore become the 21st century's mechanism for

The $400 hammer story was front-page headline news for newspapers and fodder for late-night comics. Former US Vice President Al Gore even instituted a "Hammer Award," ridiculing the infamous incident, for government employees who achieved cost-cutting measures

(Weigelt, 2013). Imagine if instead of the slow-moving news cycle of paper media in the 1980s, this hammer story occurred in today's world of social media. One can envision that a viral Fyre Festival reaction would occur.[4] But there is just one problem – the $400 (or $600 as it was sometimes reported) hammer story was really just an accounting artifact (Mothershed, 2012). It was the result of an allocation of overhead by the contractor on a bulk purchase buy to all items equally – there was no $400 hammer (Freedberg, 1998). Now imagine that monitoring of Air Force sentiment is occurring in social media. The Air Force could quickly get the true facts of the story out, perhaps not to avert, but to stem the tidal wave of negativity in social media. Perhaps the legend of the $400 hammer would not exist.

Negative news is problematic. It has a tendency to be popular, as anyone who watches the nightly news knows. The intuition is corroborated with data from this Air Force social media analysis. A correlation matrix analyzing popularity of Tweets (where popularity is measured by total number of engagements to include favorites + retweets + replies) and sentiment scores from the BING and AFINN lexicons illuminates these findings in Table 1. As expected, the two sentiment scores from the BING and AFINN lexicons display nearly perfect positive correlation at 0.93. [5] What is more interesting is the individual correlations between the engagements and the lexicons. The BING sentiment and engagements are negatively correlated at -0.62 and the AFINN sentiment and engagements are negatively correlated at -0.37. [6] The interpretation is that tweets with negative sentiment are more likely to be popular. Therefore, negative shifts in sentiment can serve as a signal that corrective action/information on the part of the Air Force may be desired before negative news becomes viral.

Table 1: Engagement and Sentiment Correlation

	Engagements	**BING**	**AFINN**
Engagements	1	-0.62	-0.37
BING	-0.62	1	0.93
AFINN	-0.37	0.93	1

As previously discussed, negative sentiment has consequences for the Air Force. Finding a mechanism to determine when sentiment about the Air Force is trending negative and identifying the influential entities in a cost-effective manner is paramount. Text mining is one inexpensive option. For example, the "R" programming language is a free software environment that is currently used for data analytics (including Text Mining) by members of the Air Force such as statisticians and operations research analysts. Text Mining can also be employed quickly and handle "big data" associated with large analyses of social media information. These features make it an attractive option.

5. CONCLUSIONS

An enhanced analysis of social media can provide benefits to the United States Air Force as it does to a private organizations. Rather than turning to polls or surveys to question consumers on their opinions, social media provides a perspective from consumers who volunteer their opinions, unedited and in real-time (Curnow, 2016). When social media is combined with the Text Mining methods used in this analysis, the results provide insight into the specific topics being discussed and help identify the key players (i.e. influencers) that are driving the viral nature of certain topics.

Specifically, this analysis revealed that while overall sentiment on the Air Force is positive, there are areas of negative sentiment. The Air Superiority mission area was found to have negative sentiment attributable to items such as F-35 spending or policies that block the sale of the F-35 to Turkey. The data shows that these negative instances are more likely to be popular and go viral. Additionally, the analysis identified those user groups who are most influential. The *Bloggers* group, followed by the *News/Press* group are the most influential in the data set examined. Awareness of the social media discussions within these groups is important for the Air Force. Developing an in-house analytic capability to quickly diagnose the discourse and respond, when appropriate, with factual based evidence to correct inaccuracies or re-vector discussions to consider key missing information is important to upholding the integrity of the Air Force brand within the American public. The alternative is to neglect social media, which may result in undesired consequences relating to war, fiscal policy or other policy matters affecting the Air Force.

Prior to implementing a change in Air Force social media operations, legal considerations must be taken into account. Air Force Public Affairs is governed by Air Force Instructions (AFIs) that delineate their duties

and responsibilities (Director of Public Affairs, 2016). Our first recommendation, which proposes growth of in-house analytic capability proficient in Text Mining techniques to monitor and analyze social media discourse, is commensurate with the current governing AFIs. Resources towards this end should first be allocated to analysis of those user groups found to be most influential. As this recommendation utilizes publicly available information, it should be uncontroversial.

Our second recommendation requires more scrutiny. This recommendation is for Public Affairs to act (i.e. inform), when appropriate, upon analysis of the information. The specific suggestion here is to act when inaccurate or missing information in the social media realm is found or public sentiment has switched in an undesirable manner.[7] The decision to provide information is only recommended when it complies with current directives and must be careful not to cross the line to targeted persuasion rather than informational messaging. Ambiguities should be vetted via thorough legal deliberation prior to action in those instances.

This study conducted an exploratory step into the utility of Text Mining in the social media realm for the United States Air Force. Resource constraints are always a consideration. Text Mining, utilizing free software environments such as R, is an economizing tool that can provide valuable insights on public discourse at minimal cost. Future research should consider analysis on longer periods of time, different social media platforms, or other military Services. Tocqueville's art of association has shifted to the realm of social media. Now is the time for the United States Air Force to more fully employ available techniques to capitalize upon the change.

DISCLAIMER

The views expressed in this article are those of the authors and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the United States Government.

ENDNOTES

[1] This idea is commensurate with philosophers such as John Locke, who originated the phrase "tabula rasa" or "blank slate" to describe the mind at birth. Locke, and later David Hume, believed that there are no innate ideas in the mind. All of our knowledge must come from experience in the physical world.

[2] A tweet is a post or message on the social media application *Twitter*

[3] The R programming language has prebuilt sentiment datasets. Three of the most popular lexicons for single words in R are AFINN (created by Finn Arup

Nielson), BING (created by Bing Liu) and NRC (created by Saif Mohammad and Peter Turney). These lexicons have been used by prior text-mining research efforts examining United States defense acquisition in the works of Amanda McGowin et al. "A Text Mining Analysis of Acquisition Reforms and Expert Views," *Defense Acquisition Research Journal* 25, no. 3 (October 2018): 288-323, https://doi.org/10.22594/dau.18-802.25.03

[4] The Fyre Festival was promoted as a luxury music festival concert on a remote island with tickets costing thousands of dollars. The event, however, suffered significant problems related to food, accommodations, and artist relations. A single tweet of a plain cheese sandwich in a Styrofoam container by an event attendee went viral, resulting in a media storm surrounding the event and its founders. Two documentaries (on Hulu and Netflix) were released in 2019 about the Fyre Festival.

[5] The BING and AFINN lexicons are both measuring sentiment albeit with different lexicons. s a result, it is expected that they would produce similar results and therefore be highly correlated with one another.

[6] This result was tested for significant with a resulting p-value of 2.2e-16.

[7] Note that the recommendations are *not* intended to extend to the realm of Military Information Support Operations (MISO) as delineated in AFI 10-702.

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THE SIZE OF ARMED CONFLICTS: ECONOMIC AND MILITARY IMPLICATIONS IN THE 21ST CENTURY

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In the context of the current military conflicts, a series of consequences can be distinguished which, if a century ago they were exerted on the involved states and their neighbors, nowadays they develop over a much wider geographical area, sometimes even managing to encompass the global sphere. These economic-military implications of an armed conflict are accentuated in their speed of propagation in time and space, especially by the phenomenon of globalization which benefits from an ever wider development, in the context of technological advance from one day to the next. Under these conditions, any military action exercised on the territory of a state has a series of consequences, which are immediately manifested, from an economic point of view, here referring to the stock exchange, to the possibilities of investment at the local level, but also to imports and the exports of the respective state in correlation with the effects of the military conflict. Discussing the medium and long-term effects, these can vary depending on the geographical region where the conflicts take place and the relations that state has with its neighbors and what kind of global actor it is.

Key words: military conflicts, economic repercussions, immediate impact, Euro-Atlantic space, globalization phenomenon.

1. INTRODUCTION

The size of armed conflicts in the contemporary era, compared to those before it, has been drastically affected, taking into account, first of all, the technological advance and the industrial revolution that have led to a much more complex phenomenon of war, from all points of view. Thus, a modern armed conflict has many more implications of different orders, compared to those before the 18th century, which not only affect the respective region, but also the external partners of the state in question, with which it conducts its relations.

Taking the Byzantine-Arab wars as an example, it can be observed that apart from the two regional actors involved in this war,

other essential factors were not included. Such a type of war in the Middle Ages is characterized mainly by the objectives set and the means used, the main goal being territorial conquest, having at hand armed forces and tools of war, standard at the time, with a short range.

In such a conflict situation, the only effects of the two participating states were manifested in economic, military and social terms, but without affecting the geographical regions around them.

In the 21st century, taking into account the phenomenon of globalization and the economic interdependence of states, the effects of a large-scale armed conflict are felt in the first instance among the countries with a direct relationship with the actors directly involved in the conflict, and then they expand indirectly and to most countries around the globe.

Currently, we are witnessing such a situation, in which two states are in full conflict, namely the war waged by Russian Federation in Ukraine. This extensive conflict led to a series of crises that affected and continues, mainly on the European continent, then expanding, on the Asian and American continents.

2. THE IMMEDIATE ECONOMIC CONSEQUENCES OF THE WAR IN UKRAINE

On February 24, 2022, Russian military structures, deployed on the border with Ukraine, proceeded to invade it, under the pretext of freeing Russian citizens, who were on Ukrainian territory and who were considered by the Kremlin leadership as citizens abused by the Ukrainian authorities. Under this pretext, Russian Federation hid the name of this armed conflict, which is a war in every sense of the word, reporting the fact that it is a "Special Military Operation" of liberation, this fact is further supported.

In the first hours after the outbreak of the conflict, most media channels reported on the actions taken by the Russian army on Ukrainian territory, and the stock market was affected almost instantly. Thus, one can observe the first effects of an armed conflict, which in the first instance affects the two actors. In the immediately following period, a series of economic effects followed, which initially manifested itself on the Euro-Atlantic area. Among them are the accelerated growth of inflation in all states, which led to the increase in the cost of citizen's lifestyles, the increase in the price of oil and gas, the decrease of the gross domestic product, etc. [1]

These economic consequences manifested themselves at an alert pace, also caused by the phenomenon of globalization that amplifies and accelerates the negative effects of any war, unlike those before the contemporary era.

At the same time, another immediate effect manifested in the first days after the start of the conflict is that of a social nature and the resulting crises, namely the massive migration of Ukrainian citizens to neighboring states and Western Europe. The first wave of citizens who left the country was the one before the establishment of martial law, because after it, men who met the conditions to be enlisted in the army, were forbidden to leave the state.

After the progress of the conflict, women, children, the elderly and other categories of people who are not subject to enlistment and conducting military actions have left and continue to leave, a fact that prompts other states to take measures for the permanent integration of refugees. Romania played an important role in these actions, as many Ukrainian citizens with low incomes settled in our country, and the authorities took measures to facilitate a suitable living environment for them.

According to the decisions of the Romanian government, refugees from Ukraine benefit from certain facilities, among which the most important are the following: [2]

• the request and the right to be integrated into the labor field, without an employment permit;

• protection of refugee minors from Ukraine who are unaccompanied;

• ensuring a number of approximately 400.000 places for accommodation;

• ensuring each refugee in the special places for accommodation, material resources necessary for living, namely subsistence products, clothing and hygiene;

• free medical assistance and specialized treatment;

• protection from public order authorities;

• integration of refugee children and students from Ukraine in schools and universities in Romania.

Most of the measures taken by the Romanian government, in support of the refugees from Ukraine, were also adopted by the other states of the European bloc, with certain differences. However, facilities for war-affected people are economic in nature, which to some extent influences the financial effort for a state.

According to the measures listed above, the financial effort that a country makes, in order to help the victim state, can be observed. However, the decisions taken in this regard indirectly led to the increase in inflation throughout the European bloc, so that each state faced and still faces increases in inflation, which lead to the cost of living.

Inflation rate in the European Union during 2018-2022
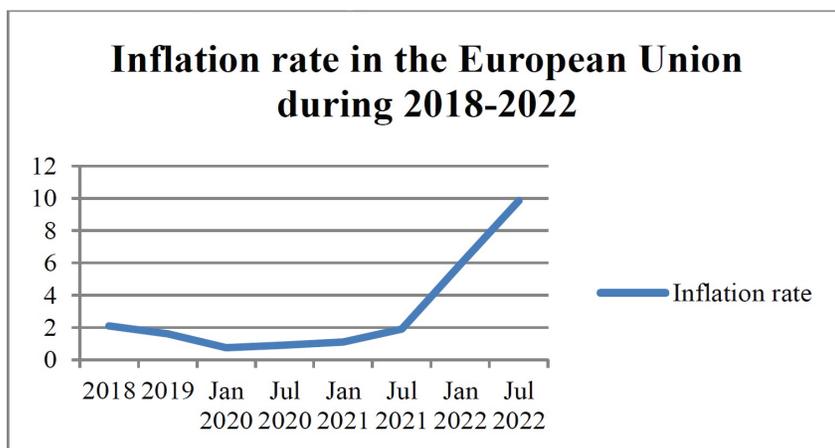
Fig.1 The graph of increasing inflation rate in the European Union

In the previously presented graph, you can see the evolution of inflation in the European Union, over the years in different political, economic and social situations, including the health crisis caused by the SARS COV 2 virus. [3]

Comparing the two crises, it can be seen that the effect of the pandemic on inflation began to be felt on the economy of the member states in the last quarter of 2021. Thus, starting from February 2022, against the background of the start of the war in Ukraine, the inflation growth graph averages in the European Union, has changed from a progressive increase during the pandemic to an exponential increase.

By correlating the above data, it is demonstrated that in a union and not only, there is a relationship of interdependence of a socio-economic nature that has an effect on the entire community. It refers to the fact that in a crisis of any nature, which affects a member state of an alliance or a union, the negative effects felt at the economic level are felt indirectly, not only on the respective state, but also in a collective framework to all other members.

In the case of inflation presented earlier, if its increase leads to the increase of most goods and services in a state, in the case of the current war, a special problem is noted. Due to local fighting in Ukraine and the supremacy of Russian forces in Black Sea, grain exports were completely blocked.

Until the outbreak of the conflict, this aspect related to the importance of exports from Ukraine was neglected, but these grains stuck in ports represent 12% of wheat production globally.[4] In this context, to the detriment of the citizens of the European space and beyond, food prices have once again

increased, correlated, however, with the already rising inflation rate.

The situation generated in May of the current year, found its solution in August with an effort of the international community, but the effects caused by this blockage are still felt today in the food of most countries. This relatively short-lived crisis put pressure on the authorities in Romania, as the ports were overcrowded, slowing down the whole process, both for the Ukrainian and the Romanian side. It is also noted that a blockade in a country whose exports are intended for a world market, affects not only the countries of destination, but also affects the neighboring states, not only by the nature of the exports, but also by the entire transport process.

All these aspects regarding the role that Ukraine had as an economic actor on the world market, prove how much the international society can be influenced by a war. Despite the fact that Ukraine's economy is on the 130th place in 2022, the consequences suffered not only by the country affected by the war, but also by the rest of the international community, show us the interdependence of states simultaneously with the phenomenon of globalization.[5]

In addition to all these crises, one of the most serious crises of the last century emerged, which the European continent has never faced on such a scale. It is the issue of electricity and natural gas. Since the Russian Federation was the main supplier of natural gas, and their delivery to member states of the European Union was stopped, their price increased by 150%. This upward trend has been visible since the end of 2021, against the background of the recovery of the economies of European states, a trend that was manifested by the 170% increase in the price of natural gas.

These increases, which reached a level never before seen in history, almost automatically generated an increase in electricity throughout the continent. Although the policy of the European Union was pro-green energy and opted for environmentally friendly methods in order to obtain electricity, the current circumstances forced the community to provide energy, from any sources. Thus, if before the Russian invasion, green energy sources, such as photovoltaic panel parks, wind turbines, hydropower plants, etc., were encouraged both from a legislative point of view and from an economic point of view, today, taking considering the high price of electricity, the ongoing crisis, but also the uncertainty about the short-term future, coal-fired power plants were reopened and anti-pollution measures were put on the back burner.

In response to the natural gas problem, the European Council

ordered a series of measures to counteract the phenomenon, as follows:[6]

• reducing gas consumption, at least for this year;

• assistance agreements between member states;

• strengthening the stock of natural gas, existing at the level of the European community, by 90%.

Currently, the first two measures are in the process of implementation, and regarding the supply of reserves, at the end of September of the current year, the member states managed to obtain an average of 88% in the gas reservoirs.

Although solutions are currently being sought and found to most of the problems generated by the present war, all these measures represent great financial efforts on the part of the member states of the European Union and, at the same time, slow down the development processes already undertaken, with a view to well beyond current crises.

3. THE SCOPE OF INVASION OF THE RUSSIAN FEDERATION IN UKRAINE

Before the invasion of Ukraine on February 24, 2022, starting in the second half of January, significant Russian forces were deployed on the border. The number of soldiers engaged in that operation was estimated at around 190.000. [7]

At the same time, the Ukrainian forces prepared the defense, being always on the alert. In this situation, an invasion of Russian Federation was inevitable, as the costs of such massive mobility could not have been thoroughly justified.

Although the actual fight is taking place on the territory of Ukraine, since the beginning of the invasion elements of the hybrid war have been noted, including cyber attacks on critical infrastructures, computer propaganda. A first example was in the very first hours after the start of the conflict, when sources from the Russian mass media reported the defeat or surrender of the Ukrainian army. Also, portraying the Ukrainian military in an unfavorable light or even demonizing it by portraying it as a Nazi army attacking its own population played a role in reducing Ukrainian citizen's trust in the ruling authorities and lowering the morale of the fighting forces.

As countermeasures, the European Union ordered the ban on the activity of the publication Sputnik throughout the Union. This fact came only a few days after the start of the conflict, being established as one to

prevent disinformation, manipulation of the population in favor of Russian Federation and distortion of the real situation on the ground.[8]

In the same sense, since the start of the conflict, the European Union has taken numerous measures to weaken the Russian Federation's ability to support the war, most of them being economic measures. Among the most important, there are the exclusion of the most important Russian banks from the SWIFT system, the ban on European airspace of Russian aircraft, the freezing of financial assets in European banks, influential figures at the top of the Russian Federation leadership and other packages of measures aimed at weakening its economy. At the same time, the European community offered support for the population of Ukraine through non-refundable funds of billions of euros for the affected civil society, medical support and evacuation of victims of war actions.[9]

Although the nature of the conflict is destructive, the union's response to the aggressor state is one that comes in support of Ukraine and may have the effect of ending the war earlier, given the economic weakening of the Russian Federation.

From the point of view of military capabilities, in a ranking of 142 countries, Russian Federation is in 2nd place, compared to Ukraine, which is in 22nd place. In making the ranking, the following are taken into account: [10]

• the population - active military personnel, in reserve, fit for military service;

• financial strength - the budget allocated to defense, the gross domestic product and the external debt;

• air forces - special, transport and attack planes, helicopters;

• land forces - tanks, armored vehicles, artillery and land missiles;

• naval forces - aircraft carriers, frigates, corvettes, submarines, destroyers, patrol ships;

• national resources and reserves;

• geographical environment;

• infrastructure – roads, railways and bridges.

Although from the position of the aggressor, the Russian Federation is clearly superior, having ratios of forces and means much greater than those of Ukraine, sometimes even 10 to 1, Ukraine has managed and continues to do so, to resist, having the advantage of its own land and being supported with equipment and military technique from the member countries of North Atlantic Treaty Organization.
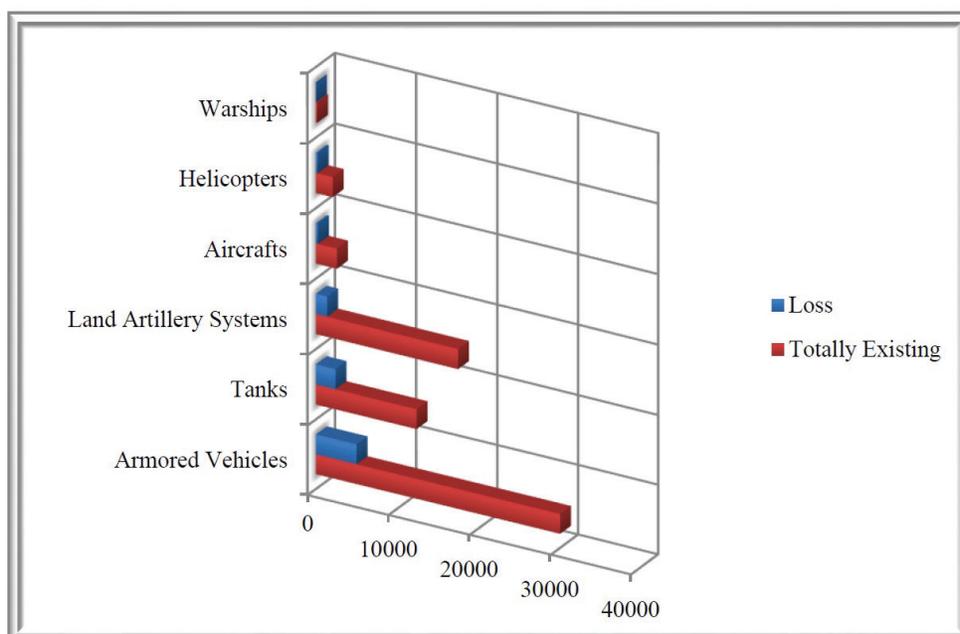
Fig.2 The situation of losses of Russian military equipment
from its totally existing [12] [11]

In the attached figure, the total losses are presented in comparison with the total combat technique existing at the level of the Russian Federation. On the side of the forces, out of a total of approximately 900.000 active military personnel, approximately 60.000 soldiers died, 182,000 were wounded. In order to preserve the morale of its own troops and maintain an image of a professional army in front of the international community, the Russian Federation continues to deny the figures announced by the authorities in Kyiv, the reported ones being much lower.

Given that in this conflict, a wide variety of combat techniques are used, in open terrain, the Russian army has an advantage, due to numerical superiority. However, in the conquest of the main objectives, namely the big cities, a series of urban battles are taking place, which put the Russian forces in difficulty. The destructive nature of the conflict is also reflected in the use of ground artillery which is ideal for besieging a city from a distance, as its range is not interfered with by contact forces such as infantry and armored vehicles. In support of the artillery, the bombing aviation in turn causes great damage to the cities, destroying a large part

of the infrastructure, but especially the transport routes, railways or roads.[13] Although Russian Federation had air supremacy over Russian airspace at the beginning of the invasion, it was regained by the Ukrainian camp only a few weeks later. This fact has drastically slowed down the advance of Russian offensive, and in the context of today, it facilitates the transition of the Ukrainian forces from the defensive position to the counter-offensive one and the recovery of the lost territories, towards the eastern direction, and currently this is concentrating on the southern regions.

All the losses represented in the previous graph were caused by a multitude of factors, despite the numerical superiority on the Russian side. One of the main factors is represented by the territorial advantage of the Ukrainians, since they are fighting on their own soil. Another aspect is related to the morale of the troops, so that throughout the last six months of the war, there have been numerous actions of desertions among Russians or those who refused to fight, even though they were in the middle of the battlefields. In antithesis to them is the Ukrainian side whose morale has every reason to be at a high level, as territorial integrity is at risk. The Ukrainian resistance was also stimulated by

the humanitarian aid, coming from certain N.A.T.O. member countries, aid in the form of equipment and means of combat. In addition to those listed and despite the military effects on the Ukrainian state, it benefits from the formal support of the international society, here referring to the International Court of Justice in The Hague which asked Russian Federation to immediately stop the aggressions in Ukraine according to the communication from March 16, this year, accusing the attacker of genocide and crimes against humanity. Also in support of the victim country, United Nations Organization, in a voting session of 193 member states, 141 voted in favor of the immediate cessation of offensive actions in Ukraine and its full territorial recognition. [14]

With such support from the largest part of the international community, Ukraine is encouraged to continue the struggle for its integrity, not just territorial, and to overcome the social and material damage caused by the war.

At the same time, there is a connection between the duration, the extent of the conflict and the global economy, affecting not only the two state actors directly involved, but also the international community, including here the smooth running of trade and its relations, the investment

exchange as well as the ability to import/export of the states indirectly dependent on the two parties involved in the conflict. [15] [17]

4. CONCLUSIONS

Following what has been presented, some conclusions can be drawn regarding the economic-military implications of an armed conflict in the 21st century. The consequences of a war are limited not only to the states directly involved, but also to the regions around them, and then they are felt by the rest of the international community.

Ever since the outbreak of the conflict, the economic effects began to be felt on the entire European bloc, and Ukraine's European neighbors undertook additional measures to reduce the effects of the war, here referring to the previously mentioned, respectively collective support measures for the affected Ukrainian civilian population.

In the current context, the action as a unitary whole of the states of the international community represents an instrument that has proven its effectiveness against Russian Federation, through the measures imposed against the aggressor state and the support of Ukraine on all levels.

Moreover, the awareness of the military threat from the eastern part of Europe has prompted states like Sweden and Finland to join North Atlantic Treaty Organization, which will contribute to a stronger defensive alliance. At the same time, considering that Ukraine is not a member of N.A.T.O. and neither of the European Union, facilitated the annexation of the Crimean peninsula in 2014, and in 2022 the invasion of the entire state. This year, Ukraine officially submitted its intention to be a member of the European Union, and on September 30 of this year, it declared that it will apply to become a full member of N.A.T.O., a fact considered from the beginning a cause for concern for the Russian Federation.

Given that throughout history it has been proven that the union between states means mutual development, common security and prosperity, a possible solution to the crisis in Ukraine would be represented by integration into North Atlantic Alliance and the European Union.

I believe that if Ukraine will be accepted as a full member of the two international formations, the process of ending the war would be much accelerated, taking into account the solidarity of the states so far, and such a future conflict will no longer be possible in the context belonging to the two formations.

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WHAT IS ROMANIA'S SECURITY PERSPECTIVE IN THE BLACK SEA REGION?

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Russia's recent aggressions against Ukraine have resurfaced the importance of NATO's Eastern Flank. Modern capabilities with allied presence are considered essential in order to assure deterrence for not just Eastern Europe but for the entire continent. However the actual areas that pose a risk and threat on the Eastern Flank have longed been deemed differently. For the Northern part of the Flank, around the Baltic Sea, due to Poland's geopolitical agenda and the Baltic States geographical position NATO has always considered strengthening this area a priority. Romania is part of the Eastern Flank but is situated in an area that has not always been considered a major strategic challenge, that of the Southern part of the Eastern Flank, around the Black Sea. The aim of this paper is to present Romania's view to the importance of the Black Sea, from a political, military and economic point of view, to analyze the country's push during NATO summits for strengthening this area and to understand what the future is for this region, after introducing the Black Sea area in the NATO Strategic Concept, following the NATO summit from Madrid.

Key words: strategic concept, energy security, defense capabilities, Eastern flank.

1. INTRODUCTION

The Black Sea has always been a security challenge for countries that have shore line on this specific area, including Romania. After joining NATO, Romania has tried to pursue the inclusion of the Black Sea into a strategic interest for the Alliance and to attract defense capabilities in order to secure this area of the Eastern Flank (Joja, 2018). However on the Eastern Flank, the Black Sea hasn't always been a priority. The northern part of the flank has always been the major focus of the alliance. Since 2022, Finland will join NATO adding even more depth to the security of the northern part of the Flank and to the Baltic Sea region.

For Romania the Black has strategic role both military and economically (Weizmen et al., 2018). The Romanian economic zone of the black sea has the potential for fossil fuel supply and has started to develop accordingly. From a military point of view the Black Sea represent an immense challenge as seen by Russia's actions during the war in Ukraine. The Russian Fleet has had an enormous presence near Romanian coast line and has had military actions near the Romanian economic zone on Serpent Island.

One important aspect that needs to be taken into consideration is the Montreux Convention. This document includes measures to increase the security of Turkey and order states bordering the Black Sea. Therefore the convention recognizes the right to transit for all commercial ships regardless of pavilion during peace time. During war time the transit of commercial ships is still permitted for countries that are neutral, as long as Turkey is not part of the Conflict. For warships the rules are different, the Turkish state have a decisive permission for which ships can enter the streams. Submarines have different rules, as they can only pass near the coastline, during day time and on the surface. During war time, if Turkey is neutral no military ships can enter the streams if they are part of the war. We have seen this rule applied during Russia's invasion of Ukraine.

The challenge with controlling the borders of the Black Sea becomes even more challenging as Turkey is set to develop a new canal in Istanbul (Nate et al., 2019). Question have risen if the Montreux Convention will be also applicable for transiting this canal or will previous security regulations for the Black Sea be renounced once this canal is fully operational.

2. ROMANIA'S STEPS IN THE NATO SUMMITS CONCERNING THE BLACK SEA

The Black Sea represents a further challenge in terms of security following the Crimean crisis where Russian troops occupied the area, closed the Azov Sea for the Ukraine fleet and captures a large part of the Ukrainian fleet that was stationed in Sevastopol (Flanagan et al., 2019).

In Figure 1 we can see part of the security challenges that exist on the Black Sea, including Russian occupied territories of Abkhazia, Tskhinvali and Crimea.
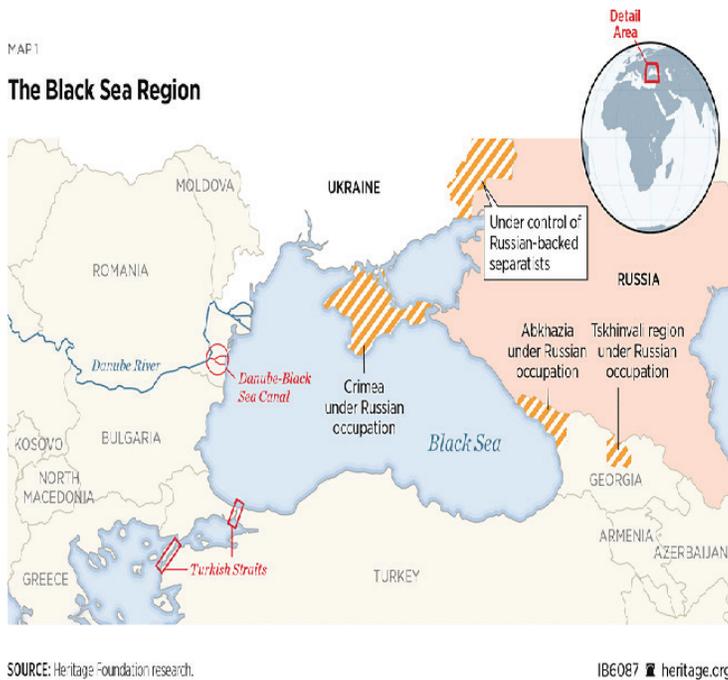
Fig.1 The Black Sea Region and its current challenges (Coffey et al., 2019)

The Azov Sea, the streams that are under the Montreux Convention are all strategic challenges that should be take into consideration when analyzing the importance of the Black Sea. While for many years atfter the end of the Cold War no one considered the Black Sea a security issue, after the Russian invasion of Crimea, Romania has tried to promote the importance of the Black Sea for the Eastern Flank. This area had been neglected in the past, as a study from CEPA shows, in 2010 the than newly adapted NATO Strategic Concept, not only did not mention the Black Sea at all, but did not consider Russia a threat or a competitor for the alliance (Horell et al.,a, 2022).

NATO's response increased following 2014, as enhanced Forward Presence by NATO was developed on the Eastern Flank but that was located in the Baltic Sea region. Romania's view and other experts view as that the two regions, specifically the two seas, the Baltic and Black sea, should not be treated separately, developing capabilities should not be realized as a trade-off between the two major areas, but rather it should be acknowledged that both face one single threat, and therefore NATO should have one unified answer. That answer would turn out to be an increased allied presence on the Eastern Flank, following the Wales Summit of 2014, where

NATO member states on the Eastern Flank like Poland, Romania, Estonia, Latvia or Lithuania also agreed to increase their defense spending up to 2% of their GDP in order to be able to also contribute themselves with national territorial forces to the joint capabilities that would be developed in their countries together with the alliance.

Following the Crimean crisis, NATO strategic documents have started to focus more and more on the importance of the Black Sea (Horell et al., b, 2022). The next Summit where Romania's agenda was to push for deterrence on the Black Sea was the Warsaw Summit in 2016. During this Summit, Russia's aggressive actions in the region where outlined, cumulated to other actions, like the strengthening of Russian forces in the Mediterranean, deploying more and more military capabilities and so forth. The response for the alliance in the Black Sea region was to support Romania's request for a multinational integrated brigade that would be developed into what now has become the Multinational Division Southeast. Georgia was also assisted on this matter and helped to enhance its air defense and air surveillance capabilities.

The Black Sea region was further strengthened during the Brussels Summit of 2018. Some objectives like increasing NATO presence and activities were continued following the previous summits, others were initiated like reinforcing allied maritime posture, developing partnerships with countries that are not NATO member states but border the Black Sea, like Georgia and Ukraine. Similar to the Enhanced Forward Presence that had been developed in the Baltic Sea region, the Tailored Forward Presence was created specifically for the Black Sea.

The 2021 Brussels Summit centered on Russia's existing and potential aggressions, condemning the blockade of Ukrainian ports around the Azov and Black sea. Cooperation with Ukraine and Georgia was strengthened even further, trying to build resilience in the two states in front of increasing hybrid threats. Another important conclusion for Romania was that the tailored forward presence in the Black Sea would be increased even further.

Russia's invasion of Ukraine changed the landscape in the Black Sea region even more. A new Summit took part in Madrid. Since 2010, the perception about the Black Sea and Russia have changed dramatically. So much, that in the 2022 Strategic Concept, Russia will be identified as a revisionist actor, an adversary to NATO, with the alliance in full awareness of the need to enhance its force posture on the Eastern Flank.

Romania's desire for the NATO Summit in Madrid was to try and persuade that a substantial and persistent presence is needed on the southern side of Eastern Flank, in the Black Sea Region. This presence should mean deterrence obtained by strengthening air defense, pre-positioning military equipment, developing infrastructure to assure the presence of back up troops. Basically Romania's goal during the Summit was to obtain a similar NATO posture for the south of the Flank to that of the north part of it. This posture is assured by American presence, battle groups presence, which will correlate the entire flank through the development of joint capabilities.

Romania's biggest desire was that the Black Sea region be contained in the NATO Strategic Concept which it now is, at article 46 of the document. Furthermore Romania has a proposal that battle groups stationed at the Black Sea be enhanced if need to battalion level and those that are to be increased at battalion level, in case of emergency even at brigade level. This request has been presented to France who is now in charge of the allied troops present in the Mihail Kogalniceanu base near the Black Sea. Other assistance in terms of military equipment, ammo, logistics have also been agreed upon for the strengthening of the area.

Romania's efforts for this crucial objectives containing the relevance of the Black Sea for the alliance have not only had national interest but represent regional challenges that can be mitigated by the member states of NATO in joint force structures operating together (MAE, 2021).

3. THE ECONOMIC IMPORTANCE OF THE BLACK SEA

For Romania, the Black Sea Region also has an enormous economic importance. For many years Romania has planned to exploit its fossil reserves discovered in the economic perimeter of the country. The challenge had become one of political dimensions ass the offshore law was blocked for many years in the Romanian parliament. Following the Russian invasion of Ukraine the Romanian parliament approved the law and therefore an analysis on the fossil reserves in the Black can be made to better understand the economic potential of this region, as well as why Romania needs to assure security for its waters not just from a strategic point of view, but also from an economical one as well.

One element that should be mentioned that in the last decade Russian important of fossil fuel like oil and gas had increased in Romania, just like they had had in the rest of the European continent,

due mainly to legislative barriers that would keep energy companies for investing in the Black Sea reserves as well as diminishing reserves from the mainland that had already been in exploitation, Romania having its first refinery ever since the 1920's.Romania's mainland gas can presumably maintain the country's need for consumption for as much as 9 to 10 years.

While the mainland reserves may be decreasing, the offshore reserves identified in the Black Sea can assure Romania's gas consumption for the following 20 years. Available resources are considered to be at around 200 billion cube meters, while Romania has an annual consumption rate of around 11-12 billion cube meters.

In Figure 2 we present the concession areas of exploitation. Investments were frozen starting with 2018 due to the fore mentioned political disagreements regarding the offshore law but starting with 2022, under conditions of security the production and distribution of gas from the Black Sea can become a reality for the Romanian economy. In the following paragraphs we aim to present some of the major investments for gas exploitation in the Romanian exclusive economic zone of the Black Sea.

The most advanced project in the Black Sea belongs to the Black Sea Oil and Gas (BSOG) conglomerate owned by American investment group Carlyle, in partnership with the European Bank for Reconstruction and Development (BERD). This group has conceded the Midia perimeter of the Black Sea EEZ of Romania. Even though investment for production of gas had been stopped following 2018 political disagreements Black Sea Oil and Gas continued to develop its necessary infrastructure. An underwater pipeline to bring the gases to mainland has been constructed in the last 5 years. Being one of the first investors in the Black Sea region, BSOG became a pioneer of the offshore exploitation in Romania, and had a role in drafting together with the Romanian state the offshore law.

When the offshore law was drafted two type of investments were determined for the private companies that would chose to operate in the area. Upstream investments that would imply a part in developing the project would be acknowledged to a percentage up to 40% by the Romanian state while royalties would be as high as 60%. Operational costs for these type of investments are usually high and they progress as the

the depth for extraction gets deeper. Naturally the first investments were realized in waters with small depth the so called shallow waters.

For BSOG this would be the perimeter entitled Midia, where two projects were developed "Doina" and "Ana". The entire Midia Perimeter has a depth of 70 meters with an estimated 9 billion cube meters of natural gas in reserves. It will take around 2 to 3 years for full operational extraction from this perimeter.

One other important perimeter is that of the Romgaz-OMV consortium which is called the Neptune perimeter. This perimeter used to belong to the Exxon-OMV consortium but Exxon backed out of the project, and sold the shares to Romanian company Romgaz.

Most of the 200 billion cube meters deposits reside in deep waters, the so called deep offshore. The biggest deposit is considered that in the perimeter Neptune, which is called Neptune Deep and is also administered by Romgaz-OMV. Drilling in deep waters is a much more complicated process and costs are therefore larger as well. Investments for such a drill are estimated to around 2 billion euros.

Another perimeter is the one called Trident owned by Lukoil in partnership with the Romanian state.

This is also a deep water perimeter considered to hold around 30 billion cube meters of natural gas, though some specialists consider the number might be even bigger than that. Few investments have been finalized in this perimeter, therefore exploitation of gas here is considered to start further in the following years than for the other perimeters.

Other existing perimeters are Histria, which is also owned by OMV Petrom, and drilling here has started in 2021. Other perimeters have also been given permits for exploitation by the Romanian state. Such are the perimeters of Muridava and Cobalcescu East for example. These are perimeters owned by Romanian private companies, but no operations for exploitation have started here so far.

The perimeters from Figure 2 are subject to further economic operations, meaning that ownership can change as well as who holds the right to invest in some the designated areas. Furthermore some of the existing perimeters can be subject to even further breakdown as the mother companies might want to split the drilling activities into different time lapse project, as investments on long term will likely take many expenses that cannot be started lightly.
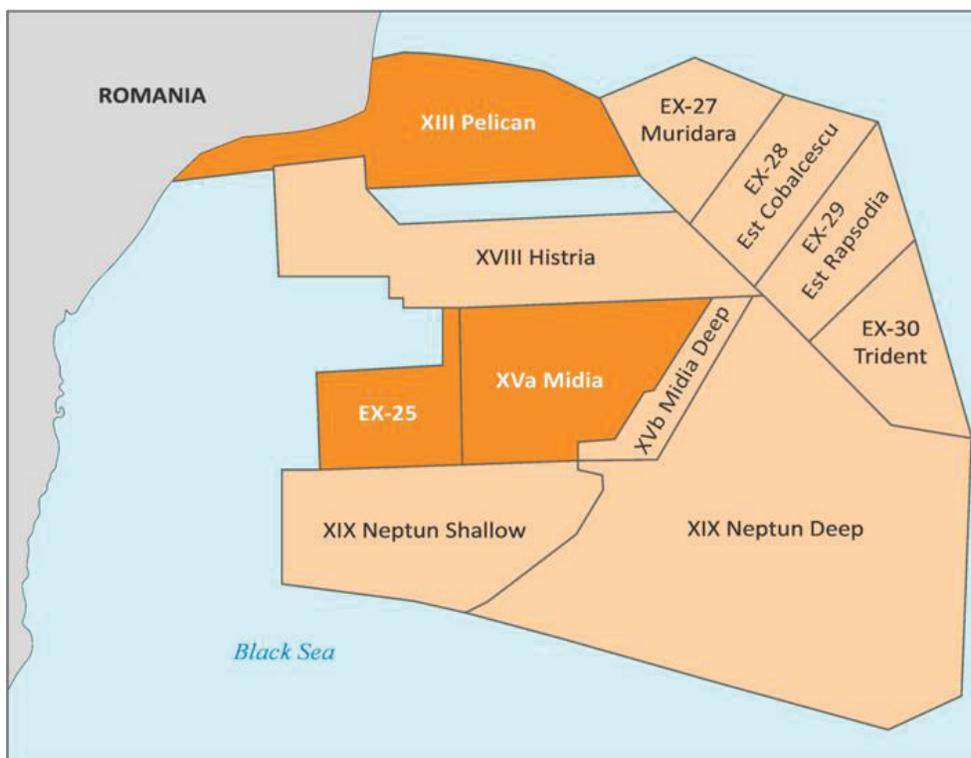
Fig.2 Perimeters for gas deposits,
Romanian Exclusive Economic Zone in the Black Sea (Globuc.com, 2019)

The potential for further development of this economic area, the fact that international conglomerates have chosen to invest in the region and by providing Romania with the opportunity to be independent from an energetic point of view creates an extra dimension of security for the Romanian state when considering the Black Sea's role for the country and the entire region.

CONCLUSIONS

Current events have demonstrated the crucial role that the Black Sea region plays from a strategic point of view, on three major fields: economic, security and political. For NATO member states bordering the Black Sea, this area has become perhaps the most important threat because of Russia's actions throughout 2022.

For Romania, the region remains a top security priority. With a global energy crisis present and economic alternative in the Black Sea identified, Romania cannot afford to not push for further deterrence and

an increase in security policies in this critical area.

NATO has deployed troops throughout the Eastern Flank. However joint forces and defense capabilities have not always been deployed in the same balance in the north, respectively in the south of the Flank. Romania's agenda, as seen in the NATO Summits presented above has been to try and persuade the alliance to always increase its military presence in the area, as only by doing so NATO could through its means assure the resilience of not just security objectives in the region, but also help increase economic growth, resolve different political crisis and even find a viable alternative for the energy crisis looming ahead.

The Black Sea represents a military hub as well, as deemed by the presence of allied troops in the MK Base, as well as the development of the US military Base in the same region as well.

The aim of this paper was not just to present Romania's efforts during the last decade in determining an increased NATO presence in the area, but to open the potential for making the Black Sea region an interconnection between economical investments, under a

security umbrella of the alliance, with the potential to develop defense capabilities that with deter any potential risks and threats, while assuring that other countries besides Romania and Bulgaria, countries that are not NATO member states like Ukraine and Georgia can benefit from a secure and democratic region, one that enables transportation of goods, economic trade and liberty of travel.

Solving the Black Sea dilemma by NATO contributes to three major crisis in one step, a humanitarian crisis that is due to the Russian invasion of Ukraine, a security crisis that is beyond the Russian threat, as the Black is subject to other risks as well and the economic crisis that is due to the energy shortage in Europe.

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RESILIENCE OF CRITICAL CULTURAL URBAN IN-FRASTRUCTURES (CCUI) IN THE FRAMEWORK OF DIGITAL TRANSFORMATIONS.
SOME MANAGERIAL *MARKERS*

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Resilience has become, in all fields of activity but also in relation to the general way of characterizing the functionality of society, an essential condition, and subsequently a state but also a process, which brings added value to organizational practice, subject to appropriate management, in the face of an increasingly diverse spectrum of crises (military, economic, etc.). The article brings to the attention of specialists and readers interested in the subject an analysis of the conceptual features of the resilience of cultural critical entities, in the contemporary context assumed to be defined by the digital dimension of the current transformations, in order to identify possible managerial frameworks for achieving a sustainable level of this state. The topic presented has been chosen mainly in the light of broad considerations on the usefulness and practical necessity of urban critical infrastructure resilience approaches in the context of reinforcing security culture concerns. In subsidiary, based on previous individual research achievements of the authors, a certain scarcity of studies was also noted, at least at the national level, in this thematic area, the opportunity of undertaking the study and the novelty aimed to be created and exposed also arising.

Key words: *criticality, cultural institutions, urban environment, resilience, management.*

1. IMPORTANCE OF THE STUDY AND LITERATURE REFERENCES

Given the general framework of approach outlined in the summary section, the research methods used were convergent with documentary analysis in order to provide a good foundation for the concepts and trends identified. The following research questions were considered, subsumed under the general objective of making new contributions to the emerging field of urban resilience management, with a desired positive effect, at least at the national level, on the resilience management of urban cultural critical features: what is the current state of the art of approaches specific to these types of infrastructures, generally at the international level, and particularly at the national level? Which are the main stakeholders involved in specific management processes? How are the functionality and implicitly the security of these entities influenced by digital transformation processes? What are the key milestones in designing and ensuring management models dedicated to the resilience of these assets?

It is gratifying that at national level we can speak of a simple search of databases in the literature, a trend of increasing approaches to the subject of resilience, contextualized of course in different areas and methodological lines. Certainly, (at the time of finalizing this article – 31st of July 2022) this trend has been boosted by the overlap (full or partial) of latent or ongoing crises (health and military) and of some that were considered as possible ones (energy and food). Compared to other types of *hard* assets (energy, transport, telecommunications, etc.) in the area of critical infrastructure, some (culture, finance, research) that we consider to be *softer* in terms of the collective perception of their contribution to the smooth functioning of everyday life have been much less talked and written about in terms of this criticality characteristic. There are, however, elaborations that link the role and importance of cultural assets to sustainability.

In an attempt to support the topicality of the topic we also bring as an argument the description of a topical work (*The Cultural Infrastructure of Cities*, announced for publication in 2023) for the topic proposed in this article, in which the coordinators Alison Bain and Julie A. Podmore place among the questions to be answered the following (https://agendapub.com):

"How does urban cultural infrastructure adapt and respond

to systemic challenges of austerity, exclusion, and inequality to articulate forms of solidarity, care and community within and beyond crises like Covid-19? And how is the cultural infrastructure of cities maintained and with what capacities to foster more resilient and hopeful urban futures?"

In this context, the inclusion of a section on *"Culture, National Cultural Heritage and National Identity"* in the recent 5th edition of the internationally renowned national scientific event "*Critical Infrastructure Protection Forum*" (14-16 June, Bucharest), with interesting and relevant presentations on the state of the art of national approaches, is a good omen. The conference will be highlighted by the communication of the Vice President of the Romanian Academy of Scientists, Doina Banciu, on "*Ethics – NonEthics in Critical Infrastructure Protection for Cultural Institution in Digital Era*", with a special focus on the functionality of museums and public libraries.

As a catalyst for setting the idea and framework for this article, the destruction of cultural assets as collateral war damage in the current conflict in Ukraine was also taken into account, in addition to previous cases in Syria, Sarajevo, Iraq, etc., some of which are of immeasurable value to human history.

2. URBAN CRITICAL CULTURAL INFRASTRUCTURES - TYPOLOGIES AND ROLE IN SOCIETY

Generically, which is supported by the literature (*Western Australian Cultural Infrastructure Framework 2030+, p.2*) cultural infrastructure is broadly defined and refers to:

"*the buildings, places, spaces, people and technology necessary for arts and cultural education, creation, production, engagement, collaboration, ceremony, preservation, conservation, interpretation, sharing and distribution*".

As a best practice in addressing cultural entities as critical infrastructures, it is notable in the US to consider them within commercial facilities, the latter containing the following sub-sectors (https://www.cisa.gov): entertainment and media; gaming; lodging; outdoor events (fairs, exhibitions, parks); public assembly (arenas, stadiums, museums, convention centers); real estate; retail; sports leagues. Further clarification of the scope of this sector is provided by specific plans drawn up for each area, the current approach for this sector being (https://www.dhs.gov):

"Are recognized both nationally and internationally as representing

the Nation's heritage, traditions, and/ or values or are recognized for their national, cultural, religious, historical, or political significance; and serve the primary purpose of memorializing or representing significant aspects of our Nation's heritage, traditions, or values and as points of interest for visitors and educational activities".

In Romania, the critical infrastructure sector "Culture and national cultural heritage" has been regulated as a typology since 2018, with the sub-sectors of public cultural institutions and protection of national cultural heritage. According to the information published on the Ministry's website (http://www.cultura.ro), monuments are classified according to both structural classification (archaeological monuments, architectural monuments, public monuments, memorials and funerary monuments) and value classification (historical monuments of national or universal value and historical monuments representative of local cultural heritage).

Given the multitude of structures that can fall into this category (based on pre-determined and governmentally agreed critical threshold sizes) we have limited the scope of our study to only those critical cultural entities located in urban areas. With regard to the role played by these assets in society it is relevant to mention here the view expressed through the *United Cities and Local Governments* platform in the context of concerns for the operationalization of *Agenda 21 for culture and Culture 21 Actions*, according to which:

"*Cultural infrastructure can develop participatory spaces for public dialogue, iterative steering, and local management. These participatory approaches can take place at all scales, that is, not only in cultural infrastructure serving a neighborhood or a community, but also in national "prestigious" facilities.*" (Duxbury et al., 2016, p. 28)

We are at this point stating that, conceptually, the resilience of urban cultural critical infrastructures contributes to increasing the resilience of the classical infrastructures listed above, because a robust individual or collective mindset (which is in turn based on the functionality and added value inherently brought by the cultural entities existing and used at a given time) plays a decisive role in educating attitude and awareness of the importance of achieving and operationalizing resilience of hard infrastructures. Strictly functionally, corroborated to some extent also with Maslow's pyramid of needs (with all

the criticisms made), the relationship described above can be reversed (for example - in the absence of electricity the history of technology museum cannot function at optimal parameters). From the point of view of a country's public agenda, investment in cultural infrastructure (creating new facilities or renovating existing ones) is an indicator of the level of development achieved.

In a broad sense, according to recent approaches with the character of a resilience directive at European level (https://www.consilium.europa.eu), the concept of critical entity is defined and will be used in the sense of

"those public or private entities that provide essential services on which the livelihoods of EU citizens and the proper functioning of the internal market depend. One of the key components of a critical entity is its infrastructure. This may include an asset, facility, equipment, network or system necessary for the provision of an essential service."

3. CURRENT CHALLENGES AND VULNERABILITIES FOR THE CRITICAL URBAN CULTURAL INFRASTRUCTURE

The current security environment is entering a phase of increased volatility and competition between state and non-state actors. From the military point of view, the deliberate targeting and destruction of the critical urban cultural infrastructures during conflicts is unfortunately not a new tactic, and it has been used in different modern conflicts in both hybrid and conventional conflicts.

NATO defines resilience as:

"*a society's ability to resist and recover from such shocks and combines both civil preparedness and military capacity. Civil preparedness is a central pillar of Allies' resilience and a critical enabler for the Alliance's collective defense, and NATO supports Allies in assessing and enhancing their civil preparedness.*" (https://www.nato.int)

This approach is useful for the analysis of the current challenges and vulnerabilities related to critical urban cultural infrastructures, as it provides the foundation of identifying both the problems, but also the opportunities presented by this type of infrastructures.

As was mentioned, the public critical urban cultural infrastructures refer to a variety of infrastructures – sports related (such as sports arenas or other public sports facilities), theaters, museums, public libraries, places of worship, monuments, but

can be extended to public spaces such as emblematic parks, public fountains or iconic buildings. The 9/11 attack had such an impact on the public psyche (both nationally and internationally) not only due to the number of casualties, but also because it targeted the Twin Towers, iconic building that were part of New York's identity. (Vail et al., 2012) The fire that damaged the Notre Dame Cathedral in Paris generated worldwide emotion, manifested in widespread grief, support, but also sparked conspiracy theories and manifestation of chauvinism or racism. Perrault eloquently captured the importance of critical urban cultural infrastructures

"*this incandescent wound also reveals the emotional dimension carried by architecture and how its universal cultural value, its unique symbolic force, and its mythical dimension nourish the arts, literature and every individual's own, personal geography*." (Perrault, 2019).

We can only imagine what would be the impact of the destruction of the Fountain of Trevi, the Mecca, the Vatican City, the Louvre museum, in the event of a war, on the morale of the population or the armed forces. This type of critical infrastructures is especially vulnerable in case of conflict, as it considered a "soft target", due to the fact that it usually benefits from less protection than other types of infrastructure, to a kinetic strike or to a cyber-attack. It is a lot easier for a state or non-state actor to attack an archeological site, a museum or a theater, than it is to attack a military base or an industrial facility. Unfortunately, there is no shortage of recent examples in this respect, such as the bombing of the Marioupol Theater by the Russian forces, in which hundreds of civilians lost their life as opposed to the difficult and fierce battle the same Russian forces had to fight in order to take control of the Azovstal metallurgical facility.

The deliberate targeting of the cultural heritage of a nation/population has been used as a weapon of war for millennia, and the modern international law prohibits the deliberate seizure, destruction or damaging of cultural property, starting from the first codifications of the laws and customs of war in the nineteenth century (Vrdoljak, 2016). More recently, in 2017, the UN Security Council unanimously adopted resolution 2347, which proclaimed the protection of cultural heritage a security imperative and condemned the deliberate destruction of cultural property as a war crime. (https://www.un.org)

The provisions of the rules of international humanitarian law must be considered (1954 Hague Convention), which define cultural property by

"*movable or immovable property of great importance to the cultural heritage of peoples, such as architectural, artistic, historical, religious or secular monuments, archaeological sites, groups of buildings which, taken as a whole, are of historical or artistic interest, works of art, manuscripts, books and other objects of artistic, historical or archaeological interest, as well as scientific collections and important collections of books, archives or reproductions of the property defined above*"

Military leaders, legal experts and civilian decision makers have acknowledged the importance of cultural and religious sites for a long time, due to their importance to a community or a nation. Considering the value of these infrastructures strictly from the material or utilitarian point of view underestimates the impact their destruction could have, as they are an intrinsic part of a complex network of inter-related cultural, social, psychological, political factors that compose the fabric underlying a community's culture. The destruction of the material components of a cultural heritage (the critical cultural infrastructure) is only a first step towards the destruction or severe damage to a culture itself, as it serves as a symbol for the origins, values, aspirations, interests and identity of a community. Often, the deliberate targeting of a critical urban cultural infrastructure has multiple aims:

As a show of power and as a means to intimidate the adversary and its allies;

As a means of getting national/international attention, promoting the attacker's own values and interests and perhaps attracting more followers;

Destroying the cultural memory and identity of a community, as an initial phase or part of a genocide.

But the critical urban cultural infrastructures are not only vulnerable in case of war. They can be equally affected by natural hazards (floods, fire, earthquakes) with equally serious negative psychological and social impact. Even the simple denial of access of the population to these types of infrastructure (which are otherwise physically undamaged) can have serious consequences on the morale and cohesion of a community. There are numerous recent examples, during the COVID pandemic, when cancelling of sports and cultural

events or restricted access to public cultural urban infrastructures has exacerbated the psychological impact of the pandemic itself and the associated social distancing/isolation measures.

In terms of opportunities, the urban cultural infrastructures should be considered critical not only based on their psychological, social and historical importance, but also due to their practical uses in terms of civil preparedness. Some of these infrastructures, especially the sports arenas or sturdy buildings can have a dual use during natural disasters. Besides their role in supporting morale and cohesion through sports and cultural events, some of this facilities could be used also during disasters (natural or caused by man), considering that building resilience requires also an appropriate infrastructure, as a crucial component of the disaster management process. The use of the Louisiana Superdome sports arena from New Orleans as "shelter of last resort" to the people unable to evacuate the ravaged city during hurricane Katrina is a good example in this respect. Sport stadiums could be designed and purposely build for this dual use, in order to allow their use for disaster relief purposes and as shelters during natural disasters. (Carpenter, 2015)

4. DIGITAL TRANSFORMATION IMPLICATIONS ON THE CRITICAL URBAN CULTURAL INFRASTRUCTURE

Digitalization and digital transformation are today imposing step by step, a new way of organizational and professional, individual and collective life, in other words nothing without digitization or everything outside digitalization is obsolete. As a working assumption, Ines Mergel et al. (Mergel et al., 2019, p.2) note that:

"The results of digital transformation efforts are changes in the delivery mode of services, but also new forms of direct interactions with customers, for example, through social media to adapt products and services according to changing customers' needs."

The experience of humanity in the context of the Covid-19 pandemic crisis has certainly been a positive influencing factor, an accelerator of the processes of digitalization, digital transformation and implicit virtualization within cultural entities. While for some of them (especially those in private ownership) the processes were either underway or at an advanced stage of implementation, for the majority of these cultural infrastructures it

was a zero moment to understand that digitization is a must, both from the perspective of ensuring the continuity of the provision of cultural services to the general public and from that of protection and security considerations.

The current trend of digital transformation has implications on the all aspects of society and the critical urban cultural infrastructures are no exception. This section proposes two main areas of analysis in this respect, both with positive and negative implications.

The digital revolution can support the preservation of the cultural heritage, through the digitalization of books, pictures, architecture, artworks etc. In the event of damage or destruction of the critical urban cultural infrastructure, the buildings could be reconstructed based on detailed plans, pictures or models preserved in digital format, while the information sheltered in those buildings (books, artwork) can be at least partially preserved or restored. Of course, on the downside, a digital reproduction of a paining will never equate the experience of seeing the real one, and this reconstruction may be extremely difficult in less developed countries, but it is at least a way to preserve some part of an important heritage.

The widespread use of social media is another area worth of analysis in respect to its impact on critical urban cultural infrastructure. The fast dissemination of information at global level regarding the destruction of World Heritage Sites, generating wide-spread outrage, may potentially convince states, international organizations to take measures to dissuade an attacker from causing further damage. On the other hand, social media can exacerbate the destruction of critical urban cultural infrastructure, as it provides an effective platform for spreading terror and/or disseminating the attacker's own values and interests.

5. CCUI RESILIENCE MANAGEMENT - DIRECTIONS OF APPROACH

It is clear that in the case of these infrastructures, from the point of view of ensuring resilience, things are much more delicate (as a consequence of the materialization of a destructive factor), compared to other sectors of the economy - transport, energy, etc. (in the sense that, for example, if the physical destruction of a collection of old books, paintings or an ancient statue has occurred, the character of uniqueness and authenticity is

eliminated, which could ensure a form of continuity of the functionality of the exhibit in question being the redundancy given by digital or virtual storage).

The issue of protecting cultural critical infrastructures and ensuring their resilience (we consider protection as a first condition for achieving a high level of resilience) is a complex one, also managed in relation to a country's economic performance (simplistically speaking, the economic aspects directly related to vitality and living standards take precedence, and then follow the others). The main types of threats identified generically (on the hypothetical example of a medium developed country with low country risk) in the case of the CCUI are: extreme weather events (low probability/2 and high impact/4), terrorist/armed attack (very low probability/1 and very high impact/5), human error in specific current activities (low probability/2 and high impact/4), organized crime (low probability/2 and high impact/4). The main vulnerability lies in weaknesses in the physical protection system of the entity concerned.

The main actions required to increase resilience in this context

are: updating the inventory of urban cultural assets (location, quantity, state of maintenance, etc.); setting criticality values (critical thresholds, sectoral criteria); applying these dimensions to existing assets and determining the list of urban cultural critical targets; drawing up security plans and putting them into practice.

In terms of allocation of responsibilities, things cannot be standardized (national specificities and the importance of cultural assets in the public agenda make the difference), but the main national departments or ministries that need to be involved are those responsible for the culture and home affairs portfolio.

It is obvious that in terms of recovery or return to baseline time ("*rising from the ashes*"), compared to other types of critical infrastructure, we are talking about much higher values or even impossibility.

For contemporary cultural infrastructures newly created or entering a cultural heritage, of course, the issue of ensuring resilience has other valences in the sense of the freshness of the rescue possibilities both by means of physical protection of the material component itself and by using the assets of the digital age.

At the European level, the following is listed (https://eur-lex.

europa.eu) among the priorities in this field:

"establishing long-term measures by implementing risk management plans in tandem with planned policies, protection measures and good practices is key for the efficient prevention and mitigation of damage in a people-centered approach to safeguarding cultural heritage."

6. CONCLUSIONS

At the level of the types of critical infrastructure officially recognized in various national or international legislative frameworks, the issue of defining and designating the existence and subsequent resilience of cultural critical infrastructure is least addressed, with examples of good practice existing in the US. Approaches to cultural infrastructures are more focused on the idea of cultural value, heritage and less on criticality and the need to operationalize integrated risk management and continuity plans as the foundations for ensuring resilience.

As a functional peculiarity, it is much more difficult to financially estimate the consequences of their destruction or inability to provide

the specific service, as the value level of the most reprehensive and outstanding ones is in many cases related to the idea of regional, national, European or even global identity. Digitalization and specific ICT processes are lines of opportunity for increasing the resilience of these infrastructures, within the framework of project management approaches.

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AN EXAMINATION OF BOKO HARAM CONFLICT AND FISHERS CHILDREN EDUCATION UNDER THE BACKGROUND OF SUSTAINABLE DEVELOPMENT GOAL IN BORNO STATE OF NIGERIA

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The study focused on an examination of Boko Haram conflict and fishers' children education under the background of sustainable development goal in Borno state of Nigeria. Interview for the research work was carried on available displaced fishermen and other people (IDPs) involved in fishing activities in major fish market of the state (Baga Motor Park) within the period of thirty (30) days; from 04th of the months, February to 04th March, 2022. Data for the study was obtained from a primary and secondary sources and was analyzed with the application of qualitative technique. The result of the study revealed that Boko Haram conflict does not affect the level of consciousness and commitment in the promotion of education but have negative effect on the free basic education and has affected long-life equitable and inclusive quality education learning opportunities of fishers' children education in the study area. Recommendation were made for the attainment of sustainable fishers' children education through formation of international forum, devising a means of reconstruction, rehabilitation and resettlement of the displaced fishers and vigorous sensitization campaign on awareness creation in the study area.

Key words: Boko Haram Conflict, Fishers Children Education, Sustainable Development Goal.

1. INTRODUCTION

Borno as part of Northern Nigeria initially received the western-style of education with suspicion and caution while compared to other parts of the country where western style of education was whole heartedly accepted and had gone far in its pursuit. Although, it was gradually accepted at a later period, as a result Borno State is educationally backward relative to other part of the country that had embraced western style of education at early stage in performance in the new educational landscape and more so with the eruption of Boko Haram insurgency it has caused serious setbacks in its socio-economic and educational drive of the state (Lamido, 2021).

Boko Haram started around the year 2002/2003 as a non-violent movement calling for the youth to shun the existing educational setting, avoid participating in politics and work towards ousting the entire Nigerian polity and replacing it with the sharia on their strict interpretation. After winning a number of youth who voluntarily accepted its call, the group, starting from 2009, turned violent and caused one of the most devastating uprisings and crises in recent Nigerian history, growing to become one of the most notorious militant groups globally, originated from Borno State and other 5 states of the northeast Nigeria which collectively remain the insurgents major operational field and also the states remain with the highest victims inflicted (FGN, 2015).

In 2015 thirty-seven percent (37%) of the Internally Displaced Persons (IDP's) in Borno, Adamawa and Yobe States were between the age of six (06) and seventeen (17) years. It was also estimated that over 800,000 school-aged children were displaced in Local Government Areas of Borno State. This has significantly increased the number of out of school children. Over 910 schools had been destroyed with 1,500 schools forced to close in North East Nigeria since the Boko Haram incursion. Borno State authorities reported that 512 primary schools, 38 secondary schools and 2 tertiary institutions had been totally or partially destroyed in the state since 2010, over 611 teachers have been killed over half of which were from Borno and that 19,000 teachers had been displaced across the north since 2009 (UNICEF, 2015). According to UN, OCHA (1999) Internally Displaced Persons are persons or group of persons who have been forced or obliged to flee or leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of human rights or natural or human made disasters, and who have not crossed an internationally recognized state border.

Within the period of 2009 – 2015 Boko Haram targets were all on government educational facilities. Well planned and coordinated attacks became more brazen during day light with increased brutality and a greater focus on the education system. For example, over a period of just two weeks Boko Haram burned down at least twelves (12) schools around Maiduguri, Borno State capital in the year 2012. Boko Haram had burned 50 schools and 15, 000 school children had stopped attending school in the state due to continues waves of Boko Haram attacks on teacher and school children in May 2013. The violence had led the Borno State Government to closed public schools in twenty-two (22) out of the twenty-seven (27) local government areas of the state for at least two to three years and public secondary schools across the state for even longer although the blanket closure has been lifted in march, 2016 (Motunrayo, Mathew, Oladeler, Hadiza, Abba and Sani, 2016).

Past government of the state indicates that an estimated 49,000 children have been orphaned due to the armed conflict. Approximately, 11,000 abductees were released from Boko Haram captivity. Released abductees especially, girls have often experienced sexual, physical and psychological violence, which present challenges to their re-integration in to the educational system. For example, an infamous attack in 2014 was the abduction of 275 girls from a boarding school in Chibok, Borno State (Zanna, Musa, Yusuf and Goni, 2021).

Education is a process of imparting and acquiring knowledge and skills about ideas, values, and concepts, borne out of learning practice and experience. This definition can be shared with others, particularly the younger generation; through formal and informal institutional arrangements, such as schools, knowledge so acquired whether in humanities, liberal arts, science and technology are subsequently applied to sustain present and subsequent generations in everyday life. Therefore, every human endeavor requires one form of knowledge or another. It is the proper nurturing, transmission and application of such knowledge that guarantees the development and sustenance of every society from day to day (Abiodun, 2002).

Universal Basic Education (UBE) in Nigeria was formally launched by President Olusegun Obasanjo on 30th September, 1999. The UBE program is intended to be universal, free and compulsory. According to the implementation guidelines due attention would be given to public enlightenment and social mobilization. The document also states that teachers will always be an integral part of the process

of conceptualization, planning and executing. Every society must therefore generously invest in the development, building and nurturing of the minds of its youth in order to ensure that when the current generation passes on, subsequent ones are adequately equipped with requisite knowledge that will keep the society vibrant and continuously progressive. Education is here regarded as the instrument of social change which could transform the society in significant ways. However, in order to bring this ideal in to reality, education opportunity must be made available to a large proportion of people in the society (Enukora, 2003).

According to the Brundland Commission (formally the World Commission on Environment and Development) defined Sustainable development in 1987 as 'development that meets the needs of the present without compromising the ability of future generations to meets their own needs.' The definition acknowledges that while development may be necessary to meet human needs and improve the quality of life, it must happen without depleting the capacity of the natural environment to meet present and future needs (UN WCED, 1987).

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a Universal call for action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Nigeria, as a member nation of the United Nations, is part of the agreement of both the expired year 2000-2015 Millennium Development Goals (MDGs) and the current 2015-2030 Sustainable Development Goals (SDGs). The SDGs 4th goal reaffirms the commitment of the world to quality education for every child while emphasizing lifelong learning (UNDP, 2019).

Nigeria as a commonwealth country is committed to achieving the Sustainable Development Goals (SDGs). Nigeria was determined to adding value to its citizens through the provision of quality education at all levels. Government's commitment to all the Sustainable Development Goals (SDGs) especially SDG 4 and its ten (10) strategic targets which have direct bearing on the education of the child and vulnerable including persons with special needs (Iyabo and Tijani, 2020).

Education is the key element for achieving all the 17 Sustainable Development Goals: Education equips learners of all ages with the skills and values needed to be responsible global citizens, such as respect for human rights, gender equality and environmental sustainability. Investing in and strengthening education sector is key

to the development of any country and its people. Without investment in quality of education, progress on all other development indicators will stagnate. Education is the foundation for any nation or country to pursue sustainable development in its economic, social and environmental dimension. Education for Sustainable Development empowers learners to make informed decisions and take responsible actions for environmental integrity, economic viability and a just society, for present and future generations. It is holistic and transformational education for all people to learn the values, behavior and lifestyles required for a sustainable future and for positive societal transformation (Nevin, 2008). According to Umoh (2005) Education and Sustainable development are interwoven, intertwined, and interconnected. Development is geared towards producing or creating something new or more advanced for the society and its members. While on the other hand, education is a tool which can enhance the desired sustainable development. Thus, education and sustainable development are two sides of the same coin. The fact that education and sustainable development shows glaring connectivity probably explained why scholars emphasized the need for education for the purpose of achieving the desired sustainable development (Boyi, 2014).

Bukar and Kagu (2020) insecurity has affected Borno State and the entire North-East Nigeria from 2009 to date. Many people were killed and millions were displaced by activities of Boko Haram insurgency. The educational system in the state has suffered major set-back because of killing of many teachers and students and also abduction of both male and female students in schools, many schools were destroyed and burnt down by the sect members. The education in the north east Nigeria, which was poor prior to the insurgency, has worsened as a result of the attacks in schools and the kidnapping of students, with some being turned into suicide bombers, some were captured and recruited as bandits. This has forced most parents to keep their children away from schools.

Over-crowded classroom is another major challenges of education in Borno State as most of the schools outside Maiduguri are not operating due to the insurgency and nearly all schools are also affected in the city of Maiduguri. This type of atmosphere is not conducive for effective teaching and learning process as well as teacher and student relationship (Bukar and Kagu, 2020).

Human Rights Watch (2016) government diverted huge amount of resources from financing education and other essentials services to curtailing the insurgency.

This drastically reduced the budget for education in the affected states. Even after the insurgency, many of the existing school buildings were converted to camps for Internally Displaced Person (IDPs), further over-stretching the educational infrastructure and aggravating the educational backwardness of the region. The ability of parents to finance the education of their children has become all the way more difficult. This is because of the general poverty and stagnation of economic activities in the region, especially with the destruction of major markets, parks, and bridges. One of the most serious is the destruction of farmlands and especially the systematic devastation of agriculture which not only provides food and livestock but is the mainstay of the region's economy and employer of the majority of the sub-region's population.

Lamido (2021) education has remained a pivotal element that has always served as a foremost determinant and trigger mechanism for socio-economic development. As far as development is concerned, education is both a means and an end in itself. It is an indispensable pathway to development. It is development. The North East sub-region of Nigeria, even with its vast heritage of learning and scholarship, has remained backward in the present Nigerian competitive educational and development landscape. This has

been heightened by the multifarious damages in the area by Boko Haram which had monumental impact on educational infrastructure in the region.

Lawal, Ajayi and Imam (2021) Boko Haram insurgency has affected all the entire fabrics of Borno State especially the economic sector which the state internally generated revenue (IGR) is a subset. Although, the state has recorded a considerable increase in its revenue but in the three periods identified notably 2009, 2013, and 2016 there was a sharp drop in its internally generated revenue owing mainly to the increased spate of the activities of the insurgency.

Shettima (2017) considering the ongoing inputs to rebuild the northeast as a result of the damages caused by the Boko Haram insurgency and set it on the path of regeneration, growth and development, investment in education cannot be financed by government alone especially given the rising cost of education, dwindling nature of state revenues and competing demands on the nation's resources. Therefore, the need for intervention from non-governmental organizations will be of great importance.

UDHR (1948) the United Nations General Assembly at its third sitting in December, 1948, adopted the Universal Declaration of Human Rights (UDHR) as its working document. The Declaration was

made up of thirty items called articles and each item is stating a right that cannot be over ruled by any other law of humanity. The Declaration was the first step in the process of formulating the International Bill of Human Rights which was completed in 1966, and came in to force in 1976, after a sufficient number of countries had ratified them.

IBHR (1976) International Bill of Human Rights; article 26 and 27 are directly related to the education right. Article 26:

1. *Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.*

2. *Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups and shall further the activities of the United Nations for the maintenance of peace.*

3. *Parents have a prior right to choose the kind of education that shall be given to their children.*

4. *Article 27:*

5. *Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and share in scientific advancement and its benefits.*

6. *Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.*

7. *Omolayo (2001) the objectives of the UBE program as set up to meet the Millennium Development Goals (MDGs) and Education for All (EFA) Goals are:*

8. *Developing in the entire citizenry, a strong consciousness for education and a strong commitment to its vigorous promotion.*

9. *The provision of free, Universal Basic Education for every Nigerian child of school going age; reducing drastically the incidence of drop out from the formal school system (through improved relevance, quality and efficiency).*

10. *Ensuring the acquisition of appropriate levels of literacy, numeracy, manipulative, communicative and life skills, as well as ethical, moral and civic values needed for laying a solid foundation for life-long learning.*

Onno (2011) the National Policy on Education has the provisions for the teaching of art at all levels of Education. This is because the Nigerian government recognizes the role of art as one of the powerful instrument for self-reliant economy. It is one of the disciplines in our educational programs that avail trainees the opportunity to acquiring appropriate skills, abilities and competences in both mental and physical as equipment for the individual to live and contribute to the development of the society. As a result, the Universal Basic Education (UBE) of Nigeria favors the teaching of Art in the first nine years of schooling. Art is one of the core subjects, made compulsory to every Nigerian Child and it is free. Every stake holder will do well to embrace art as a subject because not only does art teach the physical and tangibles, it is also means of building empathy and peaceful coexistence of people within a multi-cultural society like Nigeria.

Dikwa (2022) Nigeria can only advance its economic growth and global competiveness by providing enabling policies and programs for an accessible and reliable quality education. Education in Nigeria is often perceived as an exclusive service of the government and funding of education has continued to remain a collective service of the three tiers of government. The federal, state and local governments in Nigeria have statutory responsibility to coordinate and promote education. The fact is that, most education policies and programs are government based and lack efficient strategy and structure for funding has posed a major impediment for achieving sustainable development in the education sector.

Johnstone (2006) higher education as an agent of change, national growth and instrument for the realization of collective aspiration should contribute to the development of the entire education system through teacher education, curriculum development and educational research, thereby providing the crucial mass skills and educated populace needed by any country to ensure genuine local sustainable development.

Okebukola (2012) the Nigerian government over the years have never met the United Nations Educational Scientific and Cultural Organization (UNESCO) recommendation of 26% of the total national budget allocation to education sector. It can therefore be posited that government priority to education is still very low. The fundamental justification for public funding of education is to ensure effective importation of the requisite knowledge, skills and capacities to improve the quality of life, enhance productivity and capacity to gain knowledge of innovations, so as to be able to participate proactively

in the growth and development process. That is, for the sake continuity of society and mankind, the new generation must be given the appropriate access to knowledge that previous generation have accumulated.

Dikwa (2022) unsurmountable pressure on the limited resources available, thereby resulting in dwindling promotions and static remunerations for personnel together with deteriorating working conditions. This overtime resulted in a high degree of "brain-drain" among the teaching/academic staff, incessant strikes actions, students' riots, and boycotts of lecture and many others. All these have negative impacts on the quality of education in Nigeria and how sustainability, growth and development targets are attained. Therefore, Nigerian government should key in to World Bank initiatives, currently focusing its attention in private sector participation in educational development. Working conditions and staff welfare must be given adequate considerations to foster quality education.

Dougher and Pfaltzgralt (1997) socio-economic deprivation as root cause of violent conflicts and posit that aggression is constantly a corollary of frustration and relative economic deprivation.

Feleti (2006) government must attend to socio-economic deprivation,

which is most pervasive in the north creating higher levels of poverty and inequality. From the standpoint, the bloodshed is attributed to failure to meet the human needs of social actors. Its fundamental hypothesis is that all humans have basic needs and failure to achieve it can lead to conflict being seen as a way to survive. This model conceptualizes poverty as the real threat to security not only individuals, but of Nigeria as well. The solution that is urged is to pay more attention to sustainable development as the most functional way to prevent violent conflict rooted in economic deprivation.

3. PROBLEM SETTING AND RESEARCH OBJECTIVE

In the year 2015, Baga town a renowned fishing community for it high level of fish production in the shores of the Lake Chad Basin area, Kukawa Local Government Area of Borno State, Nigeria was attacked by Boko Haram Insurgents. This led to devastative effect on the whole community and its environs which resulted to the displacement of the entire people of the whole community to settled in three (3) Local Government Areas in temporary Internally Displaced Persons (IDPs) Camps such as the MOGCOLIS, Dalori II, Bakasi, Teachers Village, Tashan Kano Stadium, Farm Centre, Garba Buzu, Elmiskin, Khurso Bashir, Deribe, Muna Moforo, Muna

Ashiri, Muna Dalti and Fariya in Maiduguri, Jere and Konduga Local Government Areas in Borno State of Nigeria.

Prior to the displacement the Insurgents attacked had adversely affected the educational sector in such areas as the level of enrolment, staff strength and the status of infrastructure and other educational facilities as a result of kidnapping, destruction and attacked of young stars. The economic status of the people has been affected considering the fact that fishing as their major occupation to earn a living was no longer feasible and worsened after the displacement as extra income gotten from secondary occupational activities such as farming, cattle rearing and petty trading which serves to support some of their educational need were no longer carried out (Zanna, Musa, Yusuf and Goni, 2021).

The fishermen IDPs from Baga fishing community in Baga Motor Park Fish Market, Borno State of Nigeria where the fishermen IDPs struggle on daily basis to earn a living reveals that the experiences of the fishermen IDPs are demoralizing; their narratives involve how one's husband, relatives or child was murdered in cold bold in their presence by the Boko Haram Insurgents, how in the process of migrating people died due to thirst, hunger or lack of strength, how

people drowned in rivers as they could not swim and how some family members in the midst of the pandemonium got missing and still have not been traced, how they watch all their life's savings and assets both inherited and acquired razed down by fire set blazed by the Boko Haram Insurgents (Shallangwa and Tijani, 2020). Not to talk of bouncing back developmentally to their normal life; economically, educationally, socially, politically and otherwise to enroll their children's in to school.

As a result of the Boko Haram Insurgency the resources meant for the development of education and other sectors of the economy are been channel for the purpose of security to contain the insurgency, maintenance of the Internally Displace person's (IDP's), rebuilding of the affected communities and other similar expenditures.

These have substantially contributed negatively to the attainments of the objectives of the Universal Basic Education Program set up to meet the Millennium Development Goals (MGGs) and the Education for All (EFA) goals and the proposed Educational Sustainable Development Goals (SDGs) by the year 2030.

Many research works have been carried out on fish production and other fisheries related development studies in the study area but research work that integrates the effect of

conflict specifically on fishermen children education with particular reference to sustainable development goals is limited in the study area.

This research work was undertaken with the main objective of examination of Boko Haram conflict and fishers' children education under the background of sustainable development goal in Borno state of Nigeria. The specific objectives are to: -

1. Determine the implication of Boko Haram conflict on the level of consciousness for education and commitment to its promotion in the study area.
2. Ascertain the effect of Boko Haram conflict on free basic education in the study area.
3. Analyze the implication of Boko Haram conflict on equitable and inclusive quality education and life-long learning opportunities in the study area.

The outcome of this research work may serve as a guide for government, non-governmental organization, stakeholders and other individuals in the society for the development of education generally such areas as in the awareness creation, promotion, improved relevance, quality and efficiency and lying solid foundation for sustainably equitable education.

The study was carried out in Baga - Motor Park Fish Market, Maiduguri, Borno State of Nigeria. The concerned of the study was fishers and other people involves in fishing activities in the study area. Interview for the research work was carried within the period of thirty (30) days; from 04th of the months, February to 04th March, 2022. The period which coincided with the period of preparation for Ramadan Fasting. There was intensive fish production and marketing and associated fishing activities. Fish demand and supply was high at that period of major religious rite.

4. METHODOLOGY AND DATA

The research work was conducted in Baga - Motor Park Fish Market in Maiduguri metropolis, Borno State, Nigeria. Amos, Gidado and Yakubu (2021) Maiduguri Metropolis is the state capital of Borno State, located between latitude $11^0 46^{.} 18^{"}$ N and $11^0 53^{.} 21^{"}$ N and longitude $13^0 02^{.} 23^{"}$ E and $13^0 14^{.} 19^{"}$ E at the Northeastern part of Nigeria. The capital city has been the most populated as well as the largest city with landmass of 50,778 KM² and population of 2, 607,497 as at 2014 and presently 3.7 million due to the recent past unrest that push the rural population to Maiduguri. The targeted population of the study area consist of all the IDP's associated with fishing activities, fourteen (14)

fishing activities; production and sales of fishing cards for fish drying, net making, boat building (Kadai), mending of fishing gears, sales of fishing gears, making and sales of twine (ropes), fishing, sorting, packaging and un-packaging of fish, marketing, transportation, loading and off-loading of fish and hiring of canoes in the study area. All the fourteen (14) fishing activities engaged by the fishermen/women IDP's were considered regardless of their scale of production or operation, skillfulness and experience in the fishing activities.

Data for the study was obtained from a primary and secondary sources. The primary data was obtained through a face to face interview and the secondary source was obtained through journals, working papers and text books sources to elicit information on the Examination of Boko-Haram Conflict and Fishers Children Education under the Background of Sustainable Development Goals in Baga - Motor Park Fish Market, Maiduguri, Borno State of Nigeria.

The population of this study involved all the IDP's involved in fishing activities in the study area. In the first stage, the IDP's fishers involved in various fishing activities were purposely selected and were stratified in to three (3) groups based on the fishing activities. The first (1)

group comprised fishing activities; the production and sales of fishing cards for fish drying, net making, boat building, mending of fishing gears, sales of fishing gears, making and sales of twine (ropes). The second (2) group concerned with the activities of fishing, sorting, processing and preservation of fish, marketing, packaging and un-packaging of fish and the third (3) group was subdivided in to transportation, hiring of canoes, loading and uploading activities. The second stage was the selection of fishers in each of the group and relevant members of their family as applicable and others engaged in unspecified fishing activities but directly or indirectly related to the economic activities of fishing in the study area.

Qualitative technique was employed in the analysis of the data and was used to interpret the examination of Boko-Haram conflict and Fishers Children education under the background of sustainable development goals in the study area.

5. RESULTS & DISCUSSION

a. Determination of the Implication of Boko Haram Conflict on the level of Consciousness and Commitment to the Promotion of Education

The study reveals that Boko Haram conflict does not affect

the level of consciousness and commitment to the promotion of education in the study area due to the fact that there exists formal system of education in their ancestral home before the displacement. Some of the fishers' children are highly educated and have secured jobs in various organizations both in governmental and non-governmental organizations also form a contributory factor in the level of consciousness and commitment for the promotion of education in the study area. The government, non-governmental organizations and individuals' philanthropies have supported the promotion of education in the provision of infrastructural facilities, teaching and learning materials and other support services which is a clear indication of government, non-governmental organizations and individual philanthropies consciousness and commitment to the promotion of education in the study area. Thus the level of consciousness and commitment by the fishers, the government, non-governmental organizations, and individual philanthropies to the promotion of education has positively contributed in sustaining fishers' children education in the study area.

This result confirmed that of Enukora (2003) Universal Basic Education (UBE) in Nigeria was formally launched by President Olusegun Obasanjo on 30th September, 1999. The UBE program is intended to be universal, free and compulsory. According to the implementation guidelines due attention would be given to public enlightenment and social mobilization. The document also states that teachers will always be an integral part of the process of conceptualization, planning and executing. Every society must therefore generously invest in the development, building and nurturing of the minds of its youth in order to ensure that when the current generation passes on, subsequent ones are adequately equipped with requisite knowledge that will keep the society vibrant and continuously progressive.

b. Ascertainment of the Effect of Boko Haram Conflict on Free Basic Education

Findings of the study shows that Boko Haram conflict have negative effect on the free basic education of fishers' children in the study area. The educational infrastructural facilities and other support services provided by the government, non-governmental organizations and individual philanthropies were destroyed by the insurgents in their original locality on displacement and after displacement; the fishers have become IDP's in Camps as such the educational facilities in IDP Camps

are inadequate; classroom buildings do not exist instead tent are being use as classroom or lessons are conducted under a tree, mats are used instead of furniture or on empty ground, congestion of number of pupils in classes, inadequate teachers, lack of qualified teachers.

This result is in line with the findings of Bukar and Kagu (2020) over-crowded classroom is another major challenges of education in Borno State as most of the school outside Maiduguri are not operating due to the insurgency and nearly all schools are also affected in the city of Maiduguri. This type of atmosphere is not conducive for effective teaching and learning process as well as teacher and student relationship.

But other aspects of teaching and learning materials and other support services are adequate such as the pupil uniforms, text books, excise books, pencil, school uniform, school bags, first aid box, toilet system, meal and other miscellaneous catered by the government, non-governmental organization and individual philanthropies. In spite the Boko Haram conflict, there has been continual support by the government and other intervention agencies which have deter the total collapse of fishers' children education and a product of such system will contribute positively in sustaining the development of education in the study area.

c. Analysis of the Implication of Boko Haram Conflict on Life-Long Equitable and Inclusive Quality Education Learning Opportunities

The study indicates that Boko Haram conflict has affected long-life equitable and inclusive quality education learning opportunities of fishers' children education in the study area both before and after displacement as a result of the fact that the fishers could not go for fishing activities because of the insecurity situation in the area before displacement thus income needed to cater for their children educational need was difficult to be attained although most of the major requirement were been catered freely by the government and other governmental organizations. The same was applicable to the children as well as the teachers and other workers of the school for the avoidance of attack by the insurgents before the displacement in their original localities. While in the IDP Camps after displacement majority of the fishers' children could not continue with their educational pursuits due to age barrier, school dropout, lack of sound educational background, poor economic status of the parent as a result of the insecurity interruption while in their original localities. Some of the fishers in the IDP camps that have extra economic activities rather than fishing are able

to secure source of income, other fishers that were able to fled with tangible assets are able to start new business on settlement, fishers that have benefitted from supports either from relations, family friends and closed associates, more so some that have benefitted from government, non-governmental organizations and individual philanthropies support program under exceptional circumstances on special ground. Fishers children that fall under such categories stood better chances of long-life quality education learning opportunities compared to the others.

This result confirmed that of Shettima (2017) considering the ongoing inputs to rebuild the northeast as a result of the damages caused by the Boko Haram insurgency and set it on the path of regeneration, growth and development, investment in education cannot be financed by government alone especially given the rising cost of education, dwindling nature of state revenues and competing demands on the nation's resources. Therefore, the need for intervention from non-governmental organizations will be of great importance.

6. SUMMARY AND CONCLUSIONS

Although Nigeria was determined to add value to its citizens through the provision of quality education at sustainable level but the education in the Northeast Nigeria was poor and has worsened as a result of the Boko-Haram conflict which led the pupil system of education at a verge of total collapsed as shown in the outcome of the research work. The following recommendations are made for the attainment of sustainable fishers' children education in the study area:

The Nigerian government should device a means for vigorous sensitization campaign for awareness creation at all level of governance to improve the level of consciousness and commitment in the promotion fishers' children education at sustainable level.

Adopt a strategic measure to ensure proper reconstruction, rehabilitation and resettlement of all the displaced fishers in their ancestral localities while taking cognizance of the educational need as priority of the resettled communities at a sustainable (long-life equitable and inclusive equality education learning opportunities) level.

Initiative for the formation of global forum for the elimination of conflict formation in whatever form or basis should be put in place such agenda as; the identification of root causes of conflict, factors emanating to the escalation of conflict and identification of avenues for overcoming conflict at preliminary stage and also devising a means for remedy.

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DETERMINATION OF COORDINATES OF TARGETS FROM UNMANNED AERIAL VEHICLES

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The article provides a mathematical solution to the problem of determining the coordinates of the target discovered during reconnaissance of the area by a reconnaissance drone.

Key words: unmanned aerial vehicle, area reconnaissance, target coordinates, angle of direction, geographical coordinates, longitude, latitude.

1. FOREWORD

The experience of wars and armed conflicts in recent years shows that modern combat operations have the following features: the use of unconventional forms of combat operations; increased accuracy and targeting capabilities of weapons used; giving greater priority to information warfare; the use of computer modelling, new control and reconnaissance systems. Based on these features, the general trend in the technological development of weapons and equipment is the use of artificial intelligence technologies, the miniaturization of weapons systems (reducing size and weight) and power consumption, increasing their versatility and autonomy, as well as simplifying their supply [1].

According to many military experts and foreign specialists, military unmanned (manned) systems and robotics will be the most promising types of weapons and military equipment combining the above areas [2]. It is expected that the large-scale application of artificial intelligence and robotics will change the methods of warfare and the technical characteristics of advanced weapon systems, increase their effectiveness and minimize personnel losses.

Analysis of the Second Karabakh War and a number of local armed conflicts shows that whenever the use of manned aircraft is impossible or inadvisable (strong enemy air defences, use of radiation, chemical and bacteriological

weapons in the combat zone, as well as long-range enemy forces, etc.) the use of unmanned aerial vehicles (UAVs) for various tasks is assumed [3, 4].

Modern UAV complexes should perform the following tasks [2,5]:

1. Intelligence tasks:

- aerial reconnaissance (Figure 1);

- coordination of artillery fire;

- guiding high-precision weapons (target illumination);

- assessment of the impact of the attacks, etc.

2. Firing and impact tasks:

- elimination of ground, surface and air targets.

important to automatically determine target coordinates and promptly transmit them to the relevant ground points.

2. MATHEMATICAL ASPECTS OF DETERMINING TARGET COORDINATES

A military drone is an unmanned aerial vehicle is equipped with a video camera and a radio-rangefinder device. Considered that drone is equipped with device to determine the geographic coordinates and angle of the video camera and radio-rangefinder placed on board.

It is envisaged that the UAV will monitor (observe) terrain by
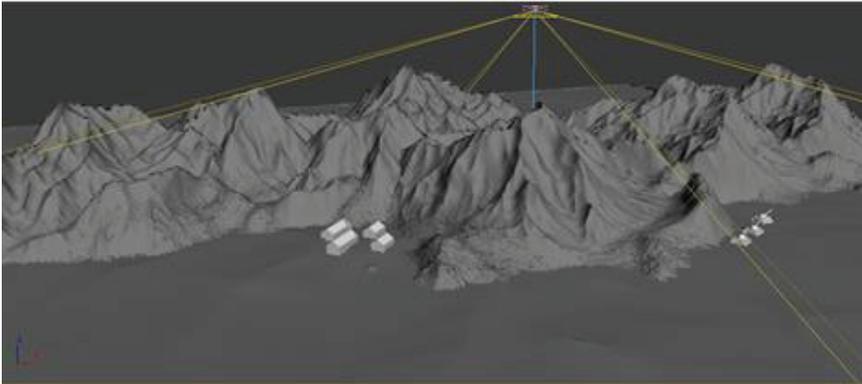
Fig. 1 Aerial reconnaissance by UAV

When performing these tasks, the UAV complex first of all conducts reconnaissance of the specified area, detects stationary or moving enemy objects, determines their coordinates or transmits images directly to the command post. When coordinating artillery fire or guiding high-precision weapon (target illumination), it is

hovering (without shifting) at a given altitude after detecting a target while performing a combat mission. In this case, after identifying the detected target, the UAV determines the distance to the target by means of a radio-rangefinder. In the process of surveillance, the targeting angles of the video camera (radar) can be

determined based on the data from the navigation devices on board the UAV. The main objective of the study is to develop a model for determining the geographic coordinates of the target based on this information.

problem, we introduce a rectangular coordinate system. *Oxyz* located at the point $O(U_G, E_G)$ on the Earth's central surface as follows (Figure 2). Assume that the *Ox* axis is oriented parallel to the eastward direction, the
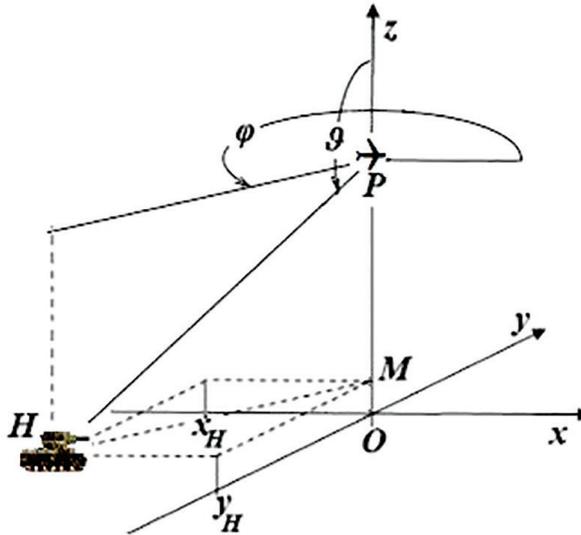

Fig. 2 Target coordinate diagram

2.1. Mathematical formulation of the problem

Let us denote the geographic coordinates of the UAV as U_G, E_G, where U_G, E_G are longitude and latitude, respectively. Since the military UAV observation area is very limited, the observed part of the surface can be considered flat. This allows the use of a rectangular coordinate system to simplify the calculations. To formulize the

Oy axis is oriented northward in the meridian direction, and the *Oxyz* axis is perpendicular to the axis plane.

The camera direction to the target is determined by the following two angles:

φ - the angle between the projection of the camera gaze direction onto the *Oxyz* plane and the *Ox* coordinate. This angle is considered positive when it is rotated clockwise and coincides with the axis;

ϑ - the angle formed by the viewing direction of the camera with the Oz axis. This angle is measured in all directions, starting from the positive direction of the Oz axis, and varies practically in the range $\left[\frac{\pi}{2}, \pi\right]$.

The point at which the UAV is in space relative to the $Oxyz$ coordinate system is P, the point at which the target is located is H, and the distance between them is $d = |PH|$. According to the exercise, the distance d is calculated with the help of a radio-rangefinder mounted on board the UAV, and therefore it is assumed to be known. Based on the angles (φ, ϑ) representing the camera direction to the target, the position of the UAV and the target relative to the $Oxyz$ coordinate system can be schematically described as shown in (Figure 1.) Thus, the solution to the problem in question is to find the geographic coordinates of point H by calculating the coordinates x H, y H with respect to the $Oxyz$ coordinate system.

2.2. Solution of the problem

To calculate the coordinates of the rectangles x_H, y_H with respect to the $Oxyz$ coordinate system, the known values of the angles (φ, ϑ) can be applied as follows:

$$HM = d \cdot \sin\vartheta;$$
$$x_H = |HM| \cdot \cos\varphi = d \cdot \sin\vartheta \cdot \cos\varphi;$$
$$y_H = |HM| \cdot \cos\varphi = d \cdot \sin\vartheta \cdot \sin\varphi.$$

As can be seen from (Figure 1), the longitude circle of point x_H, 0, 0 coincides with the longitude circle of point H, and the latitude circle is equal to E_G. Therefore, the calculated formulas for the longitude circle of point $(x_H, 0, 0)$ are simplified. Similarly, we see that the latitude of point $(0, y_H, 0)$ coincides with the latitude of point H, and the longitude circle equals to U_G. Therefore, the formulas for calculating the latitude of point $(0, y_H, 0)$ are also simplified. To determine geographical coordinates of a point by calculated distances x_H and y_H one can apply, for example, Mercator projection formulas (6, p.44):

$$\begin{cases} X = R \cdot E, \\ Y = R \cdot \ln\left[\operatorname{tg}\left(\frac{\pi}{4} + \frac{U}{2}\right)\left(\frac{1 - \varepsilon \sin U}{1 - \varepsilon \sin U}\right)^{\frac{\varepsilon}{2}}\right], \\ \varepsilon = \sqrt{1 - \frac{r}{R}}. \end{cases} \quad (1)$$

where R and r are the equatorial and polar (polar) radius of the Earth, respectively;

(E, U) and (X, Y) are the coordinates of the point in question in geographic and Mercator projection, respectively.

Applying formula 1 of system (1), we can calculate the circumference of point *H* with respect to point *O* as follows:

$$E_H = E_G + \frac{x_H}{R}. \tag{2}$$

Calculating the latitude of point *H* results in solving the following equation:

$$\text{tg}\left(\frac{\pi}{4}+\frac{U_H}{2}\right)\left(\frac{1-\varepsilon\sin U_H}{1-\varepsilon\sin U_H}\right)^{\frac{\varepsilon}{2}} \tag{3}$$
$$= \exp\left(\frac{y_H}{R}\right)\text{tg}\left(\frac{\pi}{4}+\frac{U_G}{2}\right)\left(\frac{1-\varepsilon\sin U_G}{1-\varepsilon\sin U_G}\right)^{\frac{\varepsilon}{2}}.$$

Since equation (3) is non-linear with respect the unknown U_H, approximate calculation methods can be used to find its solution, e.g. the dichotomy method [7, p.39; 8, p.86].

Thus, formulas (1)- (3) can be applied to calculate the geographical (E_H, U_H) coordinates of the target based on UAV observation data.

3. CONCLUSION

In the Second Karabakh War, the use of UAVs as reconnaissance, firing and direct-attack missiles and artillery strikes changed military tactics and laid the foundation for a unique innovation in large-scale warfare. Thus, the combat tactics used by Azerbaijan Armed Forces engaging anti-aircraft missiles differed significantly from those used in local armed conflicts. This difference is evident in the scale of the war, in the combat capabilities of the opposing sides, and in the conduct of combat in mountainous areas and terrain that is difficult to traverse.

In mountainous terrain, with abrupt changes in terrain profile, it is difficult to determine the location of enemy forces and equipment, and there is uncertainty in information about the enemy. This creates problems when planning combat operations, determining firing points, conducting reconnaissance and detecting invisible enemy objects, and making last-minute decisions by commanders. In this regard, equipping reconnaissance and attack UAVs with appropriate computing devices would be a means of solving the aforementioned problems. The mathematical model for determining target coordinates from the aforementioned UAVs can be used in the design and production of military UAVs in Azerbaijan.

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MANAGEMENT OF UAV ENERGY CONSUMPTION MINIMIZATION

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One of the urgent problems of the use of unmanned aerial vehicles (UAVs) is the choice of an energy-saving flight mode. With such flight modes, a large flight range and successful completion of the mission are ensured. Many options for saving energy consumption can be considered and offered. In this paper, in order to minimize energy consumption, it is proposed to optimize the UAV flight path. The choice of the UAV's flight path should be chosen such that the flight would be as smooth as possible, without sharp turns. When conducting experimental UAV flights, when choosing the optimal trajectory, the result of saving energy consumption was achieved up to 20%.

1. INTRODUCTION

In recent decades, unmanned aerial vehicles (UAVs) have been widely used in various fields of science, technology, industry, the national economy, as well as in the military field. One of the urgent problems of UAV application is the choice of energy-saving flight mode. This is very important for performing, in particular, reconnaissance missions: with energy-efficient flight trajectories, a greater flight range and more efficient task performance are achieved [Bayramov:2022; Xiang et al. 2020; Dukkanci: 2021; Yong: 2016].

When using UAVs for reconnaissance gathering, one of the key tasks is to plan the path in such a way as to minimize the power consumption of the UAV. Most existing methods usually take the shortest flight distance as the optimal target for planning the optimal path, i.e. it is assumed that the shortest path means the least energy

consumption of the UAV. However, it should be taken into account that a change in direction (course) can also consume the energy of the UAV in flight, because any change in the flight course is associated with the acceleration of the UAV. And this, in turn, causes an increase in energy consumption.

Previously, it was believed that when calculating the power consumption of a UAV, only the flight range is taken into account. It was assumed that the shorter the flight distance, the lower the energy consumption. That is, the rectilinear movement contributes to the minimum energy consumption. However, in most cases, when performing a reconnaissance mission, when the UAV examines (photographs) a lot of randomly located objects on the ground, the UAV does not fly in a straight line, but along a very complex trajectory with many changes in the flight course. According to the laws of classical mechanics, even at a constant flight speed $|\vec{V}|=const$, a change in the UAV heading means a change in the flight speed vector.

2. RESULTS AND DISCUSSION

Let consider a change of UAV flight path (figure 1).

Between points a, b and c, the UAV is flying along a straight line. The course does not change, $|\vec{V}|=const$, the energy consumption is minimal. If the UAV is flying between points a, b and c', then in this case the course at point b changes by the angle θ, and the flight speed during the time Δt changes by
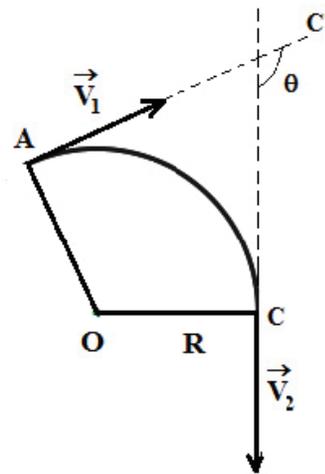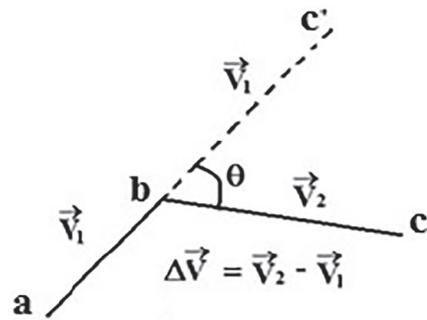

Fig. 1 A change of UAV flight path

$\Delta \vec{V} = \vec{V}_2 - \vec{V}_1$. The change in speed per unit time is acceleration: $\frac{\Delta \vec{V}}{\Delta t} = \vec{a}$. With each turn and acceleration, change in the flight course of the UAV, there is an additional consumption of energy. With a smoother change in the UAV flight course, as can be seen from Figure 1, the rotation angle θ becomes small, i.e. a speed change $\Delta \vec{V} = \vec{V}_2 - \vec{V}_1$, an acceleration $\vec{a}$, and hence the consumption of additional energy will be less.

The flight of the UAV occurs in two ways (see Figure 1): 1) along a straight trajectory between points *a* and *b*, and 2) along a curved trajectory between points *a* and *c*. Then, in general, the UAV power consumption estimation model can be represented as a function

$$\Delta E_{abc} = G(d_{ab}) + F(r_{bc}),$$
$$(a, b, c = 0,1,\ldots,n;\ a \neq b \neq c)$$

Here, $r = \frac{1}{R}$ is the curvature of the turn, *R* is the turning radius, ΔE_{abc} denotes the estimated energy consumed by the UAV on the path section $a \rightarrow c$ when the UAV flies from point *a* to point *c* through point *b*.

The consumed energy includes two components: the energy consumption $G(d_{ab})$ of the UAV in the rectilinear section of the trajectory *ab*, which depends on the distance d_{ab}, and the energy consumption $F(\theta_{bc})$ when the UAV changes its heading in the section of the change in the course *bc*. Energy consumption $F(\theta_{bc})$ depend on the angle θ of course change: the smaller θ, i.e. the smoother the turn of the UAV, the smaller $F(\theta_{bc})$.

In order to minimize of the energy consumption, the UAV flight trajectory should be optimized. It is assumed that the UAV flies at a certain constant altitude. The set of nodes (course change points) consists of the starting point and node points {0, 1, . . ., n} to be flown around. The problem can be abstracted into 0–1 integer programming problem, and a path optimization model can be obtained with the least power consumption of the UAV.

Thus, this paper proposes an energy-efficient method for planning the UAV flight path when performing reconnaissance gathering by modeling the UAV energy consumption. It lies in the fact that when conducting reconnaissance monitoring, the flight path of the UAV should be as smooth as possible without sharp turns.

The simulation result shows that when using the proposed method

of the planned path with a smoother trajectory, it is possible to save at least 20% of the power consumption of the UAV for a real flight.

Experimental flights were carried out using a Trimble UX5 HP UAV (see Figure 2) [Trimble] in the absence of wind and during daylight hours. The digital camera «Sony İLCE-7R» was used to photograph objects on the terrain. Flight altitude 125 m. 950 photographs were taken with a resolution of 3-5 cm.

The weight of UAV is 2.9 kg, the dimensions of UAV is 100x65x10.5 cm. Electric motor power of UAV is 1400 W. The UAV used a Trimble Tablet Rugged PC controller. The maximum flight duration of UAV is 40 minutes, the maximum flight of UAV is range 52 km, the maximum speed of UAV is 85 km/h, the maximum UAV flight altitude is 5000 m.

The UAV was launched using a catapult at an angle of 30°. UAV landing angle is 14°. The navigation system L1/L2 GNSS (GPS, Glonass, Beidou, Galileo Ready) was used for control.

The UAV flight route and photographing points are shown in Figure 3. The monitoring (photography) area was 450x5000 m, the distance between the photographing points was 50 m.

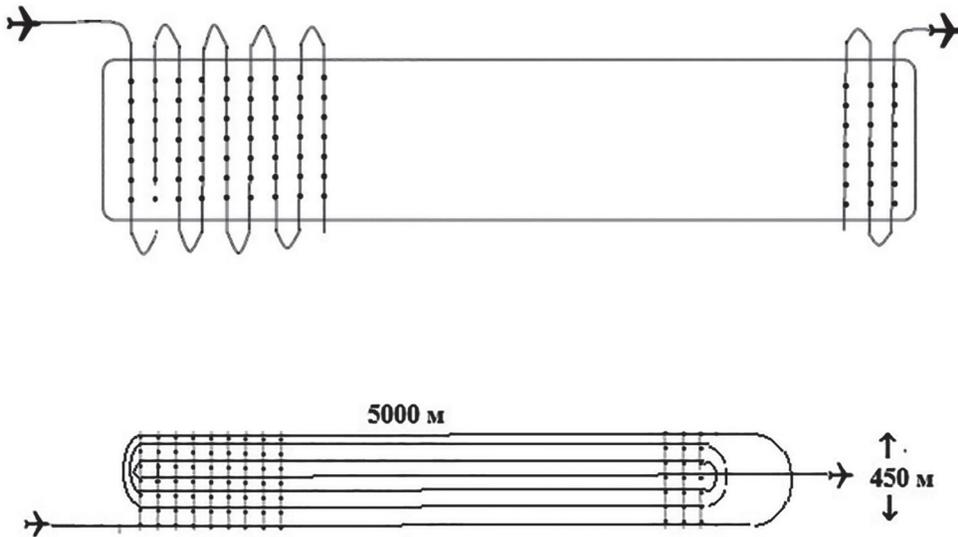**Fig.2** Trimble UX5 HP Unmanned Aircraft System

Fig. 3 The patch of UAV and point of shooting

Thus, from Figure 3 it can be seen that 450:50 = 9 lines in width, 5000:50 = 100 UAV flight lines in length.

Flight mode 1: 5000:50=100 x 450 = 45000 m, 50 turns

Flight mode 2: 9 x 5000 = 45,000 m; 9 turns,

In the second mode, energy consumption turned out to be ≈ 20% less.

3. CONCLUSION

Thus, this paper proposes an energy-efficient method for planning the UAV flight path when performing reconnaissance gathering by modeling the UAV energy consumption. It lies in the fact that when conducting reconnaissance monitoring, the flight path of the UAV should be as smooth as possible without sharp turns. Experimental flights were carried out using a Trimble UX5 HP UAV in windless conditions and during daylight hours. The result of the experiments showed that using the proposed path selection method, with a smoother trajectory, it is possible to save up to 20% of the UAV power consumption for a real flight.

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A COMPARATIVE ANALYSIS OF INDIVIDUAL BE-HAVIOR IN RELATION WITH ONLINE PURCHASES IN EUROPEAN UNION COUNTRIES

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Today purchasing goods or services online is a regular activity. That is why in this paper we have analyzed the evolution of the online purchases of the individuals in the EU countries from 2010 until 2021 in accordance with the latest data provided by the Eurostat Database. For that we used charts, dynamic indices, and dynamic rhythms.

Key words: *last online purchase, indices, rhythms of increase or decrease*

INTRODUCTION

We have created our analysis based on the data provided by the EU survey on the use of Information and Communication Technologies (ICT) in households and by individuals.

The indicators from this survey are used for benchmarking purposes and also they support measuring the implementation of the priority called "A Europe fit for the digital age".

For the practical view of the countries we have used the countries code, as follows: EU-27 (European Union 27 countries), AT (Austria), BE (Belgium), BG (Bulgaria), CY (Cyprus), CZ (Czechia), DE (Germany), DK (Denmark), EE (Estonia), EL (Greece), ES (Spain), FI (Finland) FR (France), HR (Croatia), HU (Hungary), IE (Ireland), IT (Italy), LT (Lithuania), LU (Luxembourg), LV (Latvia), MT (Malta), NL (Netherlands), PL (Poland), PT (Portugal), RO (Romania), SE (Sweden), SI (Slovenia), SK (Slovakia). We have chosen to use the average online purchases individuals' behavior for the EU-27 states considering the different political, economic and social policies that act as key variables in defining online shopping behavior.

DATA ANALYSIS

From the data provided by the Eurostat database we selected the ones regarding the last online purchase of the individuals in the EU countries, including the composite average for the EU-27 group of countries.

The first indicator that we have taken into consideration is the last online purchase made in the last 3 months. In Figure 1 we can observe that in Romania the percentage of individuals doing that slightly increased from 2% in 2010 to 15% in 2019. At the EU-27 level the

percentage increased from 27% in 2010 to 49% in 2019.

The second indicator that we have analyzed is the last online purchase made between 3 and 12 months ago. In Figure 2 we can observe once again that in Romania the percentage of individuals doing that slightly increased from 1% in 2010 to 9% in 2019. At the EU-27 level the percentage increased from 9% in 2010 to 11% in 2019. From 2017 to 2019 Romania was close to the EU-27 average.

Fig. 1 Last online purchase –
in the last 3 months
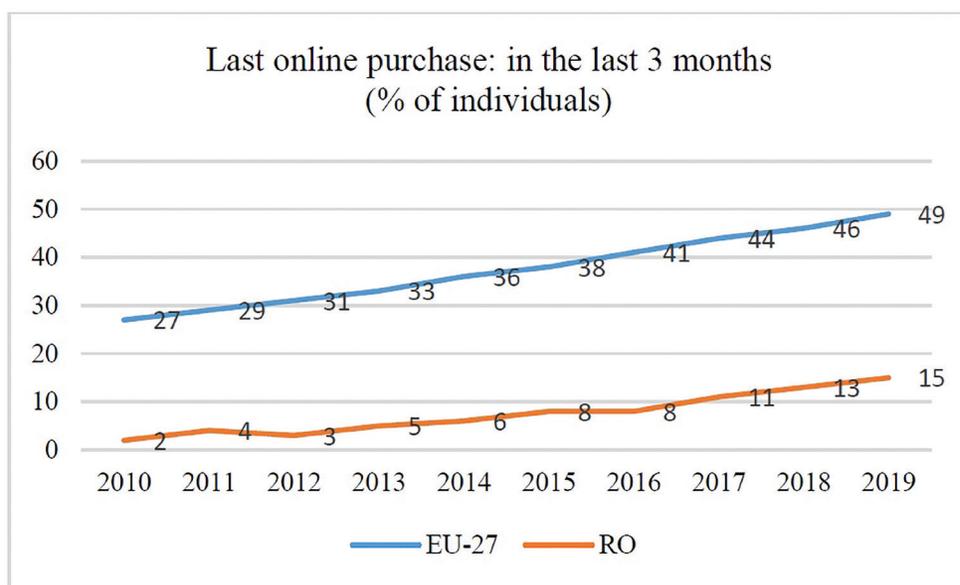
Last online purchase:between 3 and 12 months ago (% of individuals)

Fig. 2 Last online purchase – between 3 and 12 months ago
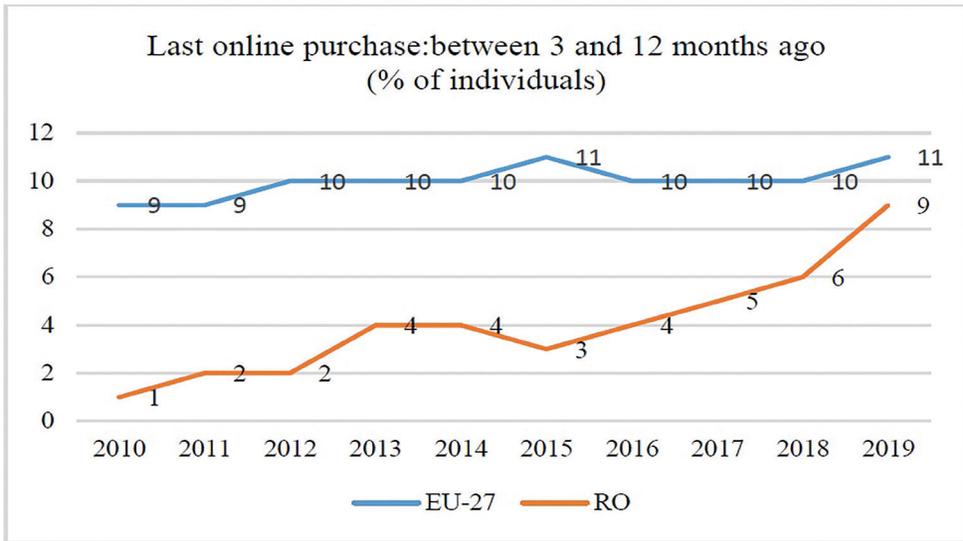
The third indicator that we have taken into consideration is the last online purchase made in the last 12 months. Figure 3 provides us the following data: in Romania the percentage of individuals doing that increased from 4% in 2010 to 23% in 2019. The percentages are not close to the ones of the EU-27 that increased from 36% in 2010 to 60% in 2019.

Last online purchase: in the 12 months (% of individuals)
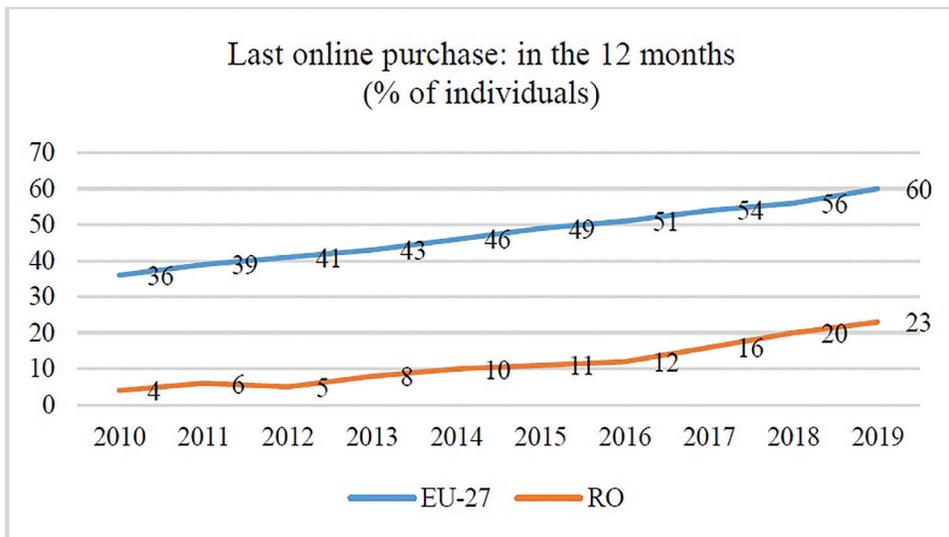
Fig. 3 Last online purchase – in the 12 months

The fourth indicator that we will analyze is the last online purchase made more than a year ago. In Figure 4 we can observe that in Romania the percentage of individuals doing that increased from 4% in 2010 to only 10% in 2019. It is the first time when for the last 7 years at the EU-27 level the percentages are lower than the ones from Romania: from 7% in 2013 to 6% in 2019.
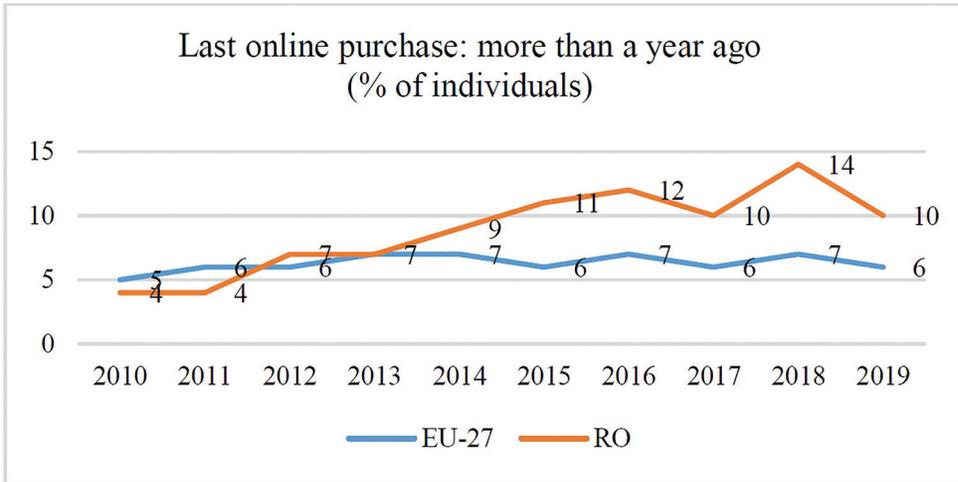

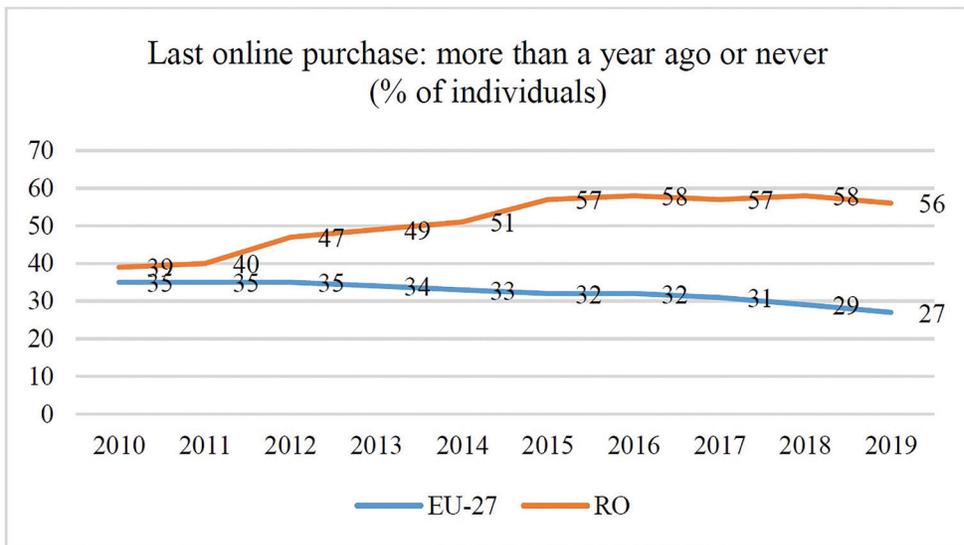**Fig. 4** Last online purchase – more than a year ago

Fig. 5 Last online purchase – more than a year ago or never

The fifth indicator that we have taken into consideration is the last online purchase made more than a year ago or never. Also this time the percentages of Romanian citizens doing that are higher than the ones of the average EU-27. In Figure 5 we can see that in Romania the percentage of individuals doing that increased from 39% in 2010 to 56% in 2019 and at the EU-27 level the percentage decreased from 35% in 2010 to 27% in 2019.

In Table 1 we have calculated the values of the changing rates of dynamic rhythms using the formula

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

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

We can see from the results in Table 1 that the percentage of individuals that made last online purchase in the last 3 months has constantly increased from 2010 to 2021 in Romania and also at the EU-27 level. For example in 2021 compared to 2015, in Romania, the percentage increased with 187.5% and at the EU-27 level with 50%.

Table 1 Dynamic rhythms for EU-27 and RO

Country	EU-27	RO
$R_{21/20\%}$	5.556	4.545
$R_{21/19\%}$	16.327	53.333
$R_{21/18\%}$	23.913	76.923
$R_{21/17\%}$	29.545	109.091
$R_{21/16\%}$	39.024	187.500
$R_{21/15\%}$	50.000	187.500
$R_{21/14\%}$	58.333	283.333
$R_{21/13\%}$	72.727	360.000
$R_{21/12\%}$	83.871	666.667
$R_{21/11\%}$	96.552	475.000
$R_{21/10\%}$	111.111	1050.000

In Table 2, Table 3 and Table 4 we have calculated the dynamic rhythms for all the EU member countries making a comparison between the percentages of individuals that made last online purchase in the last 3 months for the years 2021 and 2020, 2019, 2015, and 2010. The positive values represent an increase and the negative values represent a decrease.

Table 2 Dynamic rhythms for EU-27 – EL

Country	EU-27	AT	BE	BG	CY	CZ	DE	DK	EE	EL
$R_{21/20\%}$	5.556	-3.571	1.538	25.000	41.935	6.780	-8.000	3.797	8.772	23.684
$R_{21/19\%}$	16.327	0.000	20.000	42.857	41.935	46.512	-2.817	10.811	10.714	46.875
$R_{21/15\%}$	50.000	17.391	57.143	66.667	131.579	142.308	7.813	22.388	34.783	95.833
$R_{21/10\%}$	111.111	68.750	144.444	566.667	214.286	320.000	43.750	51.852	376.923	422.222

Table 3 Dynamic rhythms for ES – LU

Country	ES	FI	FR	HR	HU	IE	IT	LT	LU
$R_{21/20\%}$	1.852	3.333	3.125	0.000	18.367	23.438	29.032	21.429	1.449
$R_{21/19\%}$	17.021	12.727	13.793	31.429	65.714	33.898	42.857	34.211	11.111
$R_{21/15\%}$	71.875	26.531	34.694	76.923	152.174	79.545	122.222	131.818	11.111
$R_{21/10\%}$	223.529	51.220	65.000	411.111	480.000	182.143	344.444	628.571	48.936

Table 4 Dynamic rhythms for LV – SK

Country	LV	MT	NL	PL	PT	RO	SE	SI	SK
$R_{21/20\%}$	34.211	5.556	7.792	2.128	14.286	4.545	6.849	13.462	43.750
$R_{21/19\%}$	50.000	14.000	18.571	17.073	42.857	53.333	11.429	31.111	46.809
$R_{21/15\%}$	88.889	29.545	40.678	100.000	73.913	187.500	39.286	110.714	97.143
$R_{21/10\%}$	537.500	78.125	59.615	140.000	300.000	1050.000	56.000	247.059	263.158

In Table 5 to Table 8 we have made a grouping of the EU countries depending on the frequency of online purchases of the individuals in the last 3 months of 2021.

In Table 5, in 17 out of 27 EU countries the individuals making online purchases in the last 3 months of 2021: 1 or 2 times represent more than 16% of all individuals: 19% in EU-27, 17% in Austria, 19% in Denmark, 18% in Finland, 17% in Ireland, 17% in Lithuania, 17% in Latvia, 20% in Germany, 23% in Spain, 22% in France, 20% in Hungary, 20% in Italy, 22% in Luxembourg, 20% in Netherlands, 20% in Sweden, 26% in Belgium, 24% in Slovenia, and 31% in Slovakia.

In Table 6, in 24 out of 27 EU countries the individuals making online purchases in the last 3 months of 2021: 3 to 5 times represent more than 15% of all individuals: 15% in Cyprus, 17% in Greece, 17% in Spain, 16% in Croatia, 18% in Lithuania, 17% in Latvia, 17% in Malta, 17% in Poland, 15% in Portugal, 19% in EU-27, 21% in Austria, 22% in Belgium, 20% in Germany, 22% in Estonia, 21% in Hungary20% in Slovenia, 27% in Czechia, 25% in Denmark, 25% in Finland, 23% in France, 24% in Ireland, 23% in Luxembourg, 27% in Netherlands, 27% in Sweden, and 23% in Slovakia

Table 5 1 or 2 purchases in the last 3 months

Frequency of online purchases in the last 3 months of 2021: 1 or 2 times (% of individuals)	Countries	No of countries
8-12	BG,CY,HR,MT,RO	5
12-16	CZ,EE,EL,PL,PT	5
16-20	EU-27,AT,DK,FI,IE,LT,LV	7
20-24	DE,ES,FR,HU,IT,LU,NL,SE	8
24-28	BE,SI	2
28-32	SK	1

Table 6 3 to 5 purchases in the last 3 months

Frequency of online purchases in the last 3 months of 2021: 3 to 5 times (% of individuals)	Countries	No of countries
less than 15	BG,IT,RO	3
15-19	CY,EL,ES,HR,LT,LV,MT,PL,PT	9
19-23	EU-27,AT,BE,DE,EE,HU,SI	7
more than 23	CZ,DK,FI,FR,IE,LU,NL,SE,SK	9

In Table 7, in 24 out of 27 EU countries the individuals making online purchases in the last 3 months of 2021: 6 to 10 times represent more than 7% of all individuals: 9% in EU-27, 9% in Austria, 9% in Belgium, 7% in Spain, 9% in Hungary, 8% in Lithuania, 7% in Latvia, 7% in Portugal, 7% in Slovenia, 8% in Slovakia, 10% in Cyprus, 10 in Germany, 11% in Estonia, 11% in Greece, 12% in Finland, 10% in France, 11% in Croatia, 11% in Luxembourg, 11% in Malta, 10% in Poland, 15% in Denmark, 14% in Ireland, 15% in Sweden, 17% in Czechia, 17% in Netherlands.

Table 7 6 to 10 purchases in the last 3 months

Frequency of online purchases in the last 3 months of 2021: 6 to 10 times (% of individuals)	Countries	No of countries
1-4	BG,RO	2
4-7	IT	1
7-10	EU-27,AT,BE,ES,HU,LT,LV,PT,SI,SK	10
10-13	CY,DE,EE,EL,FI,FR,HR,LU,MT,PL	10
13-16	DK,IE,SE	3
16-19	CZ,NL	2

In Table 8, in 16 out of 27 EU countries the individuals making online purchases in the last 3 months of 2021: more than 10 times represent more than 8% of all individuals: 9% in EU-27, 8% in Austria, 10% in Belgium, 11% in Cyprus, 8% in Spain, 11% in France, 8% in Hungary, 8% in Lithuania, 9% in Latvia, 12% in Germany, 13% in Estonia, 13% in Luxembourg, 15% in Sweden, 17% in Denmark, 23% in Ireland, 20% in Malta, 20% in Netherlands.

has the lowest values of the percentages of the individuals doing that. Only 11% of the individuals made a purchase 1 or 2 times, the same as in Bulgaria. The lowest value was 8% in Cyprus. Also Croatia had 10%, and Malta 9%.

For the second variant – 3 to 5 time purchases, Romania has a percentage of 9%, Bulgaria 7% (the minimum value), and Italy 12%.

For the third variant – 6 to 10 time purchases, Romania has only 2%,

Table 8 More than 10 purchases in the last 3 months

Frequency of online purchases in the last 3 months of 2021: more than 10 times (% of individuals)	Countries	No of countries
0-4	BG,IT,RO	3
4-8	CZ,EL,FI,HR,PL,PT,SI,SK	8
8-12	EU-27,AT,BE,CY,ES,FR,HU,LT,LV	9
12-16	DE,EE,LU,SE	4
16-20	DK	1
20-24	IE,MT,NL	3

3.CONCLUSIONS

When analyzing the frequency of online purchases in the last 3 months of 2021 we can conclude that Romania

Bulgaria 1%, and Italy 5%.

For the last variant – more than 10 times purchases, Romania has 1%, Bulgaria 0%, and Italy3%.

The conclusion is that in Romania people are making online purchases, but only at the lowest frequency – 1 or 2 times in the last 3 months. The reasons for that can be: not having access to the Internet, not knowing how to use the Internet, not trusting the sites or the stores / trademarks, not trusting the paying method etc.

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THE IMPACT OF FACTUAL COMMUNICATION OR THE INFORMATION DEFICIT MODEL

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Most of the time, communication is considered the cause of the problems that occur in the decision making process. We assume that people lack information, but they are willing to listen and learn and we omit taking into consideration that most of the time the information we deal with is difficult to understand by non-specialists. So, in order to address this issue, the deficit model suggests a one-way communication model where information flows from experts to publics in an effort to change individuals' attitudes, beliefs, or behaviors. Basically, the model shows that if we instruct people in different domains, if they manage to acquire as much knowledge as possible, the learned information will change their attitudes and later, it will lead to behaviour change. However, we tend to oversee the fact that people are governed by affects which have a greater impact upon their reactions than the simple fact finding.

Key words: *communication, information, information deficit model, emotions, impact, emotions, bounded rationality.*

1. INTRODUCTION

The 21st century is going through an unprecedented development of information. The new, powerful technology makes its spread tremendously easy as well as the manipulation and content fabrication simple. Online networks are the best mechanism to facilitate the proliferation of the doctored and unethical information which will quickly become viral.

The information environment is subject to a continuous change due to the social, political, economic contexts which make the environment unstable and sensitive to every source of influence and to the technological advancements which allow faster communication and access to

information. Nowadays, people have quick access to numerous sources of information, both as receivers and as transmitters, and therefore the informing (communicating) and decision making process is very dynamic and, in theory at least, based on facts not assumptions. In this article we shall try to discuss why, in spite of this favourable context, communication fails one of its main purposes, behavior change.

2. THE INFORMATION DEFICIT MODEL

In 1921, the editor of the newspaper named *Manchester Guardian,* these days *The Guardian,* wrote an article on the occasion of the newspaper's centenary. The essay included the following phrase "Comment is free, but facts are sacred" which has become the motto of free, unbiased press and through extrapolation, we can say that it can also be the motto of unbiased, honest communication. The editor, C. P. Scott, explained that by this statement he did not mean that reporters, writers and editors should lack conviction or feeling, but that facts should prevail and they should be committed to act in accordance to values like "honesty, cleanness, courage, fairness, and a sense of duty to the reader and the community"

[1]. Deriving from this statement, we can say that effective communication should always contain verifiable facts, less assumptions and no distortions. The information presented should be accurate and the argumentation rational with little appeal to emotions. Unfortunately, such an approach is not very useful when it comes to impact, audiences are stirred by warm emotions and not by cold facts thus factual communication would have little echo. For many years, there has been a lot of concern and preoccupation on this matter and one of the causes identified was the fact that the audience was lacking the necessary information. This theory was named *Information deficit model* (IDM).

The Information deficit model is a concept that appeared in the 1980s and suggests that disseminating relevant, scientific information to the public, on important topics or matters of public concern, can result in people changing their perceptions, beliefs and attitude, thus leading to positive actions [2]. In 1993 Brian Wynne, Professor Emeritus of Science Studies and a former Research Director of the Centre for the Study of Environmental Change (CSEC) at the Lancaster University, wrote the article *Public uptake of science: a case for institutional reflexivity*, and in one of the footnotes, he pointed

out that "[t]he deficit model was a name first given to the conventional approach in a draft paper criticizing it, for a workshop in Lancaster in May 1988 of the Economic and Social Research Council- Science Policy Support Group research groups under the phase I Public Understanding of Science Research Initiative." [3]. This model tried to explain and address the concern of scientists why the public was skeptical about scientific discoveries basing the explanation on the assumption that the audience would be more open to such novelties if they were better informed [4].

Frequently, scientists claim that a well-grounded understanding of the relevant scientific data would help the decision making process since the problems people have when taking decisions result from the lack of information and scientific evidence. Indeed, a decision-making process based on facts and data is an ideal method however, our daily lives are filled with *on the spur* or *on a whim* decisions which are based on emotions.

In numerous situations, communication is considered the cause of the problematic decision making process and of the information gap. In such case when we assume that people lack information, but they are willing to listen and learn we omit taking into consideration that most of the time the information we deal with is difficult to understand by non-specialists. So, in order to address this, the deficit model suggests a one-way communication model where information flows from experts to publics in an effort to change individuals' attitudes, beliefs,
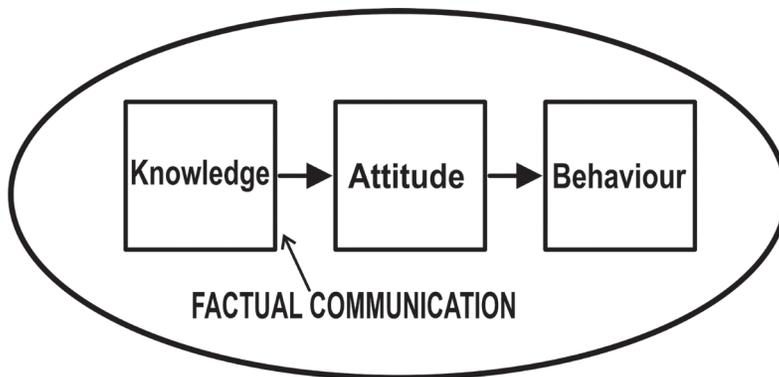
Fig.1 The impact of factual communication/ Information Deficit Model

or behaviors. Basically, the model shows that if we instruct people in different domains, if they manage to acquire as much knowledge as possible, the learned information will change their attitudes, which on their part will lead to behaviour change. Unfortunately, this only works with particular audiences and under certain conditions. It is a very simplistic representation of the relation between knowledge – attitude – belief – behavior saying that pure facts could change behavior, as can be seen in figure number 1.

3. BLENDED AND ENHANCED COMMUNICATION MODELS

The problem with this model is that it ignores that most times the actual problem the specialists lacking the ability to present their findings in such a manner that they could convince large audiences. "Information showers" will not solve the problem, what they can do is to partially correct the deficit for those interested in the specific matter, those who were already open to reflecting over things and did not have enough resources; this approach will not appeal to many others. This is the reason why information spread fails its mission to educate, to transform beliefs, to strengthen values and to change behaviors and the public ignores specialized communication. Even more, it is the reason why fake news and propaganda cannot be countered only by accurate, but cold (factual) communication and
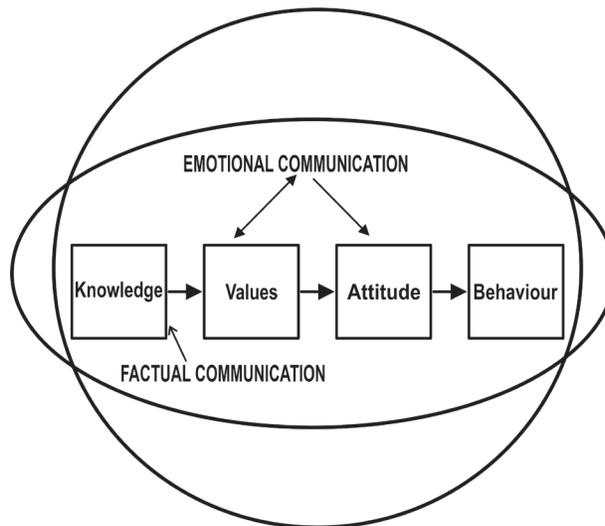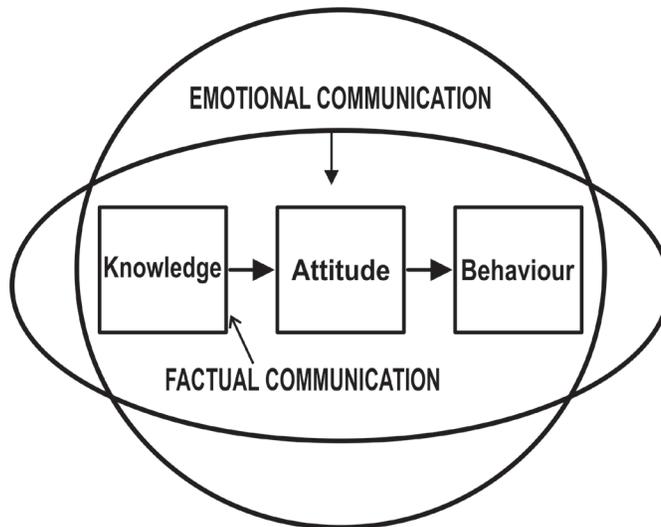

Fig. 2 Blended communication model

we should complete the model by adding the emotional factor and have a blended communication style, as can be seen in figure number 2.

public, should be done in such a manner that it reaches the audiences and is assimilated (figure no.3).

Fig. 3 Enhanced blended communication model

Cogito ergo sum (I think, therefore I am), Descartes' first philosophical principle should be completed by another one stating that emotions overcome reasoning most of the time. People are moved by emotions which stem from individual or common values hence, any statement that somehow contradicts or intrigues the audience will not be welcome, even more, it will be rejected. For this reason, we should combine information gap filling with the emotional appeal. Making information accessible to wide audiences, presenting it to the

Covering the information deficit brings about empowerment, people are well informed and able to take decisions on their own, but are they willing to do it? People do not live in an "aseptic" environment without any influences or biases where they are not governed by affects. Research has proven that this process is more emotional and intuitive than rational or analytical [5]. Herbert Simon revolutionized the decision theory field when he introduced *bounded rationality*, a concept stating that the decision making process has an irrational feature due to the cognitive,

information and time limitations we have, thus making it impossible to always take the optimal decision in spite of the abundance of data which can interfere with the decision path. It is very difficult to process and analyze the amount of information we have, especially when the situations are very complex and time constrained. Therefore, people developed simplified rules to help them decide, but this simplification, although necessary, leads to biases and non-ration judgments [6]. Later, Simon completed his theory by introducing the role of emotion in this process. In his essay *Making management decisions: the role of intuition and emotion* where he discusses the non-analytical decisions like those based on intuition or made under stress, "feelings of guilt, anxiety or embarrassment" [7]

More recent researches have started from the hypothesis that emotions are the lead when taking a decision [8]. Emotions that affect decision making processes are either integral or incidental. Integral emotions are those related to what impact the decision will have upon the decision maker, for example: feeling anxious about the result will make that person be more cautious and less prone to risk, while feeling confident can trigger a bold decision. Incidental emotions are not related to the decision result, but to the environment in which decisions are taken. For example, the positive or negative feelings caused by the good or bad weather influence the mood of the decision maker and therefore, the attitude towards the matter in question.

Starting from the hypothesis presented above and using the observation and interview methods with a number of 50 people with decision making attributions, over a period of one year, we can conclude that the decision making process is always a blend of analytical and emotional aspects. Such emotions can be either beneficial guides or biases which exert effects on judgments until the matter is solved and a decision is taken. Consequently, we can state that blended communication, factual and emotional, will have a greater impact upon the audience than simple factual communication. It is not the lack of information that causes the biggest problems but, the lack of implication, people do not relate to what is communicated. Fake news, hate speech, propaganda are all based on emotions and on the

echo effect (most of the time they say what people want to hear) and online media offers them the ideal place to be because echo chambers and filter bubbles function perfectly in a virtual environment which is easily accessible and very comfortable.

CONCLUSION

Emotions affect and motivate, lack of emotions makes communication drab. Causing a change in the audience's way of thinking can be done through adding new elements to consider to the existing points of reference. However, causing a change in the way of behaving requires something stronger and more subtle: emotions. Emotions stir behavior. When they are triggered, they influence "perception, attention, inference, learning, memory, goal choice, motivational priorities, physiological reactions, motor behaviors, and behavioral decision-making" [8,9]. Humans learn from situations they can relate to, which have an emotional impact, people are conditioned to be specific so, generalities have an emotionally reduced address and do not produce mass involvement.

It has already been established that effective communication is sharing information while provoking reaction, stirring action, changing behavior. Therefore, a good communicator needs to have critical thinking skills as well as emotional intelligence (E.I.). Emotional intelligence is critical for both effective communication and overall business success. When emotions are well-managed, they can become a powerful tool for achieving results, to stirring to action.

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LEADERSHIP PREREQUISITES, ACTIONS, AND STANDARDS OF BEHAVIOR IN CHANGE MANAGEMENT

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The need for organizations to become agile in terms of their structure, people competences, processes and technology employed has been ascertained since the 2000 Agile Manifesto. The most recent developments around the world in the recent years, namely a global pandemic dramatically impacting all walks of life and old ways of work, and a war repositioning power vectors and geo-strategic interests have made the requirements for focusing more on people and their interactions, finding working solutions to stringent problems, establishing collaborative relationships with major stakeholders and working with change rather than following a set plan even more prominent. Consequently, identifying and working adequately with key areas within an organization calls for a renewed interest in the role played by organizational leadership in managing change. All of the above considered, this article overviews leadership prerequisites as informed by a select number of traditional change models, revisits the actions required on behalf of leaders as informed by Kotter's change model and briefly identifies a number of change management principles which can be used as standards for measuring leadership behavior.

Key words: change, transformation, structure, resources, people, technology, leadership, resistance, agile.

1. INTRODUCTION

Change management is not just a fad phrase but an ongoing need of organizations and people altogether. In times of great distress for societies and states, organizations take the brunt and need to either find new ways of accomplishing their primary mission and strategic goals while assuring isles of stability, or to re-engineer their entire approach to how they do business. Regardless of the choices made by individual

organizations, the assumption underlying this article is that leadership remains a much coveted desideratum and also a solution for circumstances requiring various types of change, be them transitional, transactional or transformational. That informs the objectives of this article to infer some leadership prerequisites based on organizational behavior anchored types of change and the models of change proposed by Leavitt (1965) and Knoster, T., Villa, R., & Thousand, J. (2000), to identify an action based framework for leaders derived from Kotter's eight step change management model, as well as to outline a number of change management principles that could be used as standards of behavior for leadership in times of change.

2. LEADERSHIP PREREQUISITES AS INFORMED BY TYPES OF CHANGE AND CHANGE MODELS

Identifying leadership prerequisites for managing change requires, in our opinion, an organizational behavior informed perspective which, by its layered approach focused on the individual,

Fig. 1. Types of change
Source: Adapted from Andrzej A. Huczynski, David A. Buchanan (2013)
Organizational Behavior, Pearson Education Limited, p.624

the structures the latter are part of and the organization itself, provides a comprehensive outlook on what change management entails. In this respect, we believe that the approach most fit for that is proposed by Andrzej A. Huczynski and David A. Buchanan (2013:624), according to which change initiatives can be viewed as an in depth depiction of effort and results which we can metaphorically present in the shape of iceberg, as presented in the figure below.

The authors identify five types of change, as follows: surface change, shallow change, penetrating change, deep change and transformational change.

Surface change focuses on achieving efficiency and on restructuring in the form of centralizing or decentralizing. Efficiency is focused on identifying the means by which resources are employed with minimum waste. While that is one of the goals of any organization, efficiency has to run in parallel with a focus on effectiveness, namely on the extent to which the same organization meets its strategic goals. Therefore, in the case of leaders, securing the right balance between the two both

in times of stability, as well as in times of change is quintessential. In this respect, as a McKinsey article published in 2019 highlights, surface change in the form of structuring/restructuring an organization calls for a mission focused approach if efficiency and effectiveness are to strike equilibrium.

Shallow change is concerned with resource reallocation. That is mostly done by resizing organizational departments or the organization itself, such as growing or cutting the number of departments. Another approach to that also consists in improving the planning processes. As to that, an agile approach requires that resource related decisions be made under the principle of cross-functional collaboration (McKinsey, 2019) and planning be tested, allowed to change if needed and allowed to give room for further learning.

Penetrating change is tightly connected to changes in leadership and changes to an organization's definition of success, which resides in the establishment of new goals and objectives. In the case of changing leadership, we believe that the change does not necessarily involve simply replacing/promoting people, but more importantly allowing

people to grow professionally and personally so that they become better able to work with others and streamline organizational processes, structures. The McKinsey report on the type of capabilities required of 21st century leaders to develop (McKinsey, 2018) highlights that leaders first and foremost need to develop an innovative, collaborative, value focused mindset, while also taking a disciplined approach towards their own work. Second, leaders, need to have a disciplined approach towards asking more questions, allowing for more time to reflect and find the gaps, welcoming diversity of opinion and approaches and taking and opportunity and need based approach to working with challenges and identifying solutions. Leadership change also means that leaders change the way their teams work by empowering people to do their job and encouraging them to find win-win solutions. Last but not the least, penetrating change in terms of identifying new goals and objectives requires leaders to have an outcome based, value adding approach based on which the right direction is identified.

Deep change, as the name itself suggests, is related to transformations made in organizational mission, vision, values, philosophy. Unless change as a requirements and its outcomes are distinctly acknowledged within the very backbone of an organization (i.e. its mission and values), the latter cannot possibly take the right path to trod. In this respect, it is our firm belief that any organization aiming for deep change needs to revisit and emphasize the values that drive and inform people behavior and resource allocation.

Transformational change, also called a paradigm shift, aims at changing mental models, the way of thinking, the manner of solving problems, the manner of conducting activities in an organization, as well as the definition of boundaries. Transformational change is only possible through long-term education, and development of critical thinking skills.

In our opinion, successful change requires that all levels of the iceberg be touched upon. It is true that education is the primary pillar that leads to long-term changes throughout a society and inherently across an organization. But paradigm change is only possible if that works in parallel with changes or

adjustments to the mission and values of an organization that can be promoted and sustained by the right people in leadership position, as well as through the reconfiguration of structures and work models that heavily impact management practices.

A synthetic view of the above types of changes in terms of organizational behavior is provided by the change model proposed by Leavitt (1965) which emphasizes the need to take an integrated outlook on change. According to this model, the **structure of an organization, its tasks, people and technology** are intrinsically linked. As such, any change in one of those generates ripple effects, be them more or less positive, in the others. In this respect, we argue that one prerequisite on behalf of leadership lies with the ability to acquire a comprehensive view of the critical links among the four elements, along with the skill to foresee the changes in the visible and invisible network of relations underpinning the components.

In relation to the types of changes identified in this sub-chapter, Knoster, T., Villa, R., & Thousand, J. (2000) view **change as the sum of a number of elements,** as follows: **vision, skills, incentives, resources and action plans**. According to the same authors, the absence of any of the above, leads to emotional reactions such as confusion in the absence of vision, anxiety if skills lack, resistance to change if incentives miss, frustration if resources are not available or even false starts in the absence of clear-cut action plans. What we believe needs to be emphasized in the case of this definition of change is that all elements are not only prerequisites for leaders to own, but also for people working on change initiative. At the risk of stating the obvious, clear, transparent communication top to bottom and bottom to top is necessary for vision to be enacted as behavior on a day to day basis. Furthermore, the identification of the right critical skills for change initiatives is mandatory, along with the consolidation or assurance of those. Incentives and their use in terms of frequency, amount, personal predispositions, and equity principles play a major role. Last but not the least, specific, realistic, measurable, time-lined action plans must be informed by the vision for change, as well as by the need to break down the necessary skills and resources by

level of effort required and amount of resources already available or that could be incrementally acquired.

3. REVISITING KOTTER'S EIGHT STEP MODEL AND ITS RELEVANCE FOR LEADERSHIP ACTIONS

According to John P. Kotter (1999) significant results of change initiatives and efforts are only generated through time-consuming complex processes and not via simplistic, shallow approaches. What he suggests is an orderly and logical eight step process which can yield the expected results. He underlines that skipping some of the steps or following them in the wrong order is unlikely to aid.

The steps suggested by Kotter to follow when approaching change are as follows:

1. *Establish a sense of urgency;*
2. *Form a powerful guiding coalition;*
3. *Create a vision;*
4. *Communicate the new vision broadly;*
5. *Empower others to act on the vision;*
6. *Plan for and create short term wins;*
7. *Consolidate improvements and produce even more change;*

8. *Institutionalize the new behavior and make it part of organizational culture.*

Worth noting is that Kotter endorses the vital role played by leadership and its main attributes in change management, namely vision creation, implementation of change via a complex network of aligned relations, execution of change through inspiration of others. Change, in the absence of leadership and its manifestation, regardless of how well-crafted plans are, is doomed to fail. According to the aforementioned author, for step two to step four to be properly approached, top executive commitment must be 100%, whereas the majority of employees and 75% of the managers must have a "can do" attitude.

Establishing a sense of urgency can be done based on current realities or future scenarios. The aim is to increase what Kotter calls the "felt-need" for change and overcome complacency. Taking the first step is always more difficult in organizations characterized by self-satisfaction. Similarly, for creating the vision and communicating it (steps 3 and 4), it could take a few weeks, or sometimes up 12 to 24 months.

The reasons for complacency are various but they flow from the overabundance or absence of the main elements identified by Knoster, T., Villa, R., & Thousand, J., as well as by Leavitt as follows: no need to revisit the vision of the organization as a result of no sense of any looming threats or crisis that goes hand in hand with indulgence into the satisfaction of past results; the abundance of resources; organizational structures that focus the attention of employees on tactical and operational aspects only and places a lot of workload on those; self-sufficiency of the organization and its divorce from external drivers; a self-centered approach that influences the selection of performance measures and indicators and mis-directs any initiative or action for improvement. Obviously, creating the sense of urgency requires leadership to change the approach to resource availability, structural information flow, focus of employees on relevant performance management standards and indicators, as well as revisiting and heeding external requirements of major stakeholders. In our opinion, one of the most prevalent reasons for which the sense of emergency is not felt as such is the huge gap between certain organizations and their primary stakeholders that make requirements for their services or products.

An important aspect high-lighted by Kotter in step 2 is that change is by no means a lone ranger's endeavor given the multifarious decisions that need to be made. In this respect, the role of forming and working as part of a **coalition** is to collect information, process it, find alternatives and make decisions. As such, a working coalition must gather the **right** members whose main attributes are defined by: power, expertise, credibility, leadership, trust and long enduring common goal. Thus, as with any coalition formation, the latter should be made of a sufficient number of top, middle and line managers and leaders so that those left out cannot block change. Additionally, the group includes a sufficient number of leaders who have already shown evidence of their skills in the field to undergo change and consequently are able to drive the change process. Furthermore, the various departments in the organization must be represented, and the work experience along with other intangible aspects like nationality or gender, if case may be, must be

relevant for the type of change to be undertaken so that informed and good decisions are made. One major value to be emphasized within the coalition needs to be loyalty to the organization as an overall and that should override parochial attitudes and behaviors resulting from misplaced rivalry among departments that are supposed to work together and not compete. It is worth mentioning that team membership should harmonize both leadership skills (in order to drive the change) and management skills (so as to keep the whole change process under control). Last but not the least, the larger the size of the organization, the larger the number of coalition members (starting from two to three at the beginning, moving on to about six in small to medium enterprise and reaching twenty to fifty in very large organizations).

The creation of a vision for change and its communication across the entire organization are two quintessential steps. The goals of a vision are three fold: to clarify realistically and attainably the future direction and thus empower the decision-making process to eliminate clutter/overlapping projects and activities; to motivate people to take the right direction, even though on short term that means stepping out of the comfort zone; to swiftly and efficiently coordinate the actions of different and numerous people (i.e. by giving them a degree of autonomy in their actions) by being neither too specific nor too general in the statements it makes. The goal of communicating the vision is for an organization's employees to fully embrace it. Otherwise, the next step in the change process, namely empowerment, cannot be undertaken.

Empowerment of people resides first and foremost in smoothening the manner in which employees conduct their activities in order to truly grant them the power and/authority to act in accordance with change specific requirements. The areas where most of the stumbling blocks can be found and prevent true empowerment are organizational structure, training, information systems and managers' attitudes and behaviors.

Usually the success of change initiatives lies in the creation of cross-functional teams. Nonetheless, the very concept comes in contradiction with the functional structure of some organizations. Thus, too many hierarchical levels that work in a functional manner with no real

integration and whose resources and responsibilities are divided in piecemeal fashion, excessive centralization of decision-making power and the tendency to micro-manage at certain decision-making levels run drain the impetus for change.

The design of training in terms of scope, duration, target audience, time-frame is of utmost importance in building the skills required before, during and after change initiatives. It concerns not just skill development, but, equally important, attitude. In this respect, employee's buy-in and understanding of the role played by training sessions for their current or future activities is necessary and needs to be supported by human resource functions like selection, promotion, compensation, performance management, as well as by information systems.

Manager's attitudes and behaviors take the shape of command-and-control structures. Managers may drag their feet steps one through four, but their refusal to empower people make change efforts cease in the end. One last important aspect worth underlining in relation with empowerment is that it is usually the middle level

managers that act as stumble blocks for people's empowerment.

Planning for and creating short term results renders credibility to any change initiative. It can undermine the distrust of the cynics who might complain about the costs, time-frame or ambiguity of results and possibly gains more supporters. Short-term milestones also act as motivation for those in charge of executing the change and validate the vision and hence the direction of efforts.

According to Kotter, there is one basic rule that should not be broken when it comes to **consolidating improvements:** "*Whenever you let up before the job is done, critical momentum can be lost and regression may follow*". In other words, the sense of urgency should be maintained even when celebrating the results achieved. Unless the change becomes part of the organization's cultural norms, the efforts are not over. Therefore, the following checklist should become the beacon of behavior for change efforts reaching this point:
- Efforts are being made to focus on generating even more changes,
- recruitment and selection, promotion and development

become the main tools to consolidate change,

- senior leaders support a clear vision for the overall change effort and maintain the level of urgency,
- Lower ranks assume management and leadership responsibilities for specific projects,
- Interdependencies that hinder the change process are reduced.

According to Kotter, culture change is the last step in a transformation process and not the last. Changes in cultural norms and values are generated by: The connection between improvements in performance and new practices that are put in place must be overtly discussed by managers and leaders; The history of the old culture is still remembered and at the same time the reasons for which that culture no longer serves current and future goals are explained.

All of the above considered, when analyzing change initiatives and role of leadership in securing their success, we propose a set of guiding questions that could be followed:

- • Where is the need for change, what tangible objective data sustain it and do all people in critical positions in the organization sense the urgency of change?
- • What is the long-term goal that can be shared by almost all stakeholders with interest and power to influence the change?
- • What is my role in the change management initiative (i.e. legitimacy, authority) and who are my coalition members (i.e. critical positions) whom I need to work with all throughout the change process?
- • What is it exactly that the change generates in terms of tangible and intangible deliverables?
- • What are the desirable behaviors do I need to set as expectations and observe to tell-tale whether people work towards achieving the tangibles?
- • How much freedom of choice and decision-making can/will my people accept and what exactly to I need to do to empower them?
- • How do people know that we are on the right track and how do we celebrate that?
- • What do the tangibles/intangibles generated so far require to assure their sustainability organization wise?

4. SOME CHANGE MANAGEMENT PRINCIPLES AS STANDARDS FOR LEADERSHIP BEHAVIOR

One of the basic prerequisites in change management is to gain understanding of an organization's internal and external environment, as well as of its culture from a two-fold perspective: the AS IS/current description of variables and the TO BE/Envisioned state of the organization to achieve via change initiatives.

According to the Price Waterhouse Change Integration Team (1995) there are several paradoxes that need to be managed when focusing on change, even though an analysis of these rather indicates them as basic principles to heed. They are as follows:

- To reap benefits of change, **stability** is required.
- **People as individual personalities** are at the core of any endeavor.
- **Culture** must be the nexus of change initiatives.
- **People empowerment requires powerful leadership**.
- Any change is the result of **two complementary forces: tearing down the old and building the new**.

Stability concerns a clear analysis and diagnosis of what needs to change and what needs to remain in an AS IS status until preliminary steps are taken and benefits are obtained. Disbanding the whole structure of an organization and replacing it with a completely new one is possible as long as a long term vision is in place and complementary establishments conduct the mission of the organization that needs to undergo the change. More often than not, though, long-term outcomes are better secured if change is incremental. Hence, under such circumstances, diagnosing the core areas of an organization where stability needs to be secured at the beginning of the change initiative, throughout the process and at the end of the endeavor is of utmost importance. In this respect, clarity about organizational values, their enactment on a day to day basis by the people in charge of translating strategic goals into action, the identification of the jobs that are critical throughout the change process based on the core competences within the organization or its mission and filling them with the right people at the right time and for the right reasons, clarity of need for change

and maintenance of requirements on behalf of the major stakeholders are some of the elements contributing to stability throughout any change initiative.

Commitment and rewards are an important facet of managing people as individuals and not just as numbers on a roll call. They must take prevalence while also managing some key aspects contributing to those, such as:

- hiring the right people with the right skills and attitudes for the current and future state of the organization with a view to finding the right type of motivation that drives the change initiative and assures its success,
- making performance evaluation an actionable framework not just a must have guideline,
- managing individuals as a whole, namely identifying individual performance drivers and reinforcing those,
- establishing unequivocal objectives and accountability lines related to these,
- making initiative and decisiveness specific performance objectives of the organization,
- measuring team performance and building/promoting people's social skills, while rewarding individuals, as well as team effort,

- finding and promoting people who understand the need for change and are able to disseminate it and relay it to their peers,
- employing technology as a means to reduce workload, stove pipes and to secure better communication among people and departments.
- Working with high expectations and matching the results obtained upon meeting those with adequate reinforcement tools that fall under compensation, benefits and retention/attrition domains.

However well projects in change management are started based on the identification of the need for change and of the right expertise to begin and continue with the process itself, the planning, implementation and closure of the initiative by involving all relevant stakeholders and integrating all relevant aspects, change cannot be achieved unless the core values of an organization and the way they inform and influence day to day practices are understood and addressed. For a **new culture** to emerge, the right definition of competitive advantage and the actions underlying it need to be put in place. In this respect, the various

types of resources an organization has or acquires need to be approached as valuable, rare, imperfectly imitable and non-substitutable. That needs to start from the top, with the formulation of strategies, policies which emphasize exactly the values to be enacted and communicated to people through clear performance measures, hierarchical structures that work. Nonetheless, it also needs to be supported bottom up by drilling the practices that enforce and support people's efforts towards change.

People empowerment requires that leaders and managers know what their sources of power are and use those wisely. Empowerment is strongly related to creating an environment conducive to making decisions and acting in a responsive manner, establishing a high performing and passionate team and clarifying who makes decisions and what type of decisions need to be made. The roles and responsibilities of those in charge of ensuring the success of the change initiative, as well as of those who need to take over the results of change and implement them/manage them must be clarified and included in job descriptions and subsequent performance measures and evaluations, as well as reward

systems. Along that, education and training must complement the efforts if change is to endure.

In conclusion, it is leadership's role to assure stability when managing change. Additionally, leadership must be clear about the values promoted and should correlate people's empowerment with change end-state delineating the level of people's involvement and commitment. Moreover, leaders must be able to make value-adding trade-offs among legacy systems and new structures, skills, tasks, processes and technology.

5. CONCLUSIONS

If structure, people's needs and competences, the role of technology in smoothening the decision/making process, communication and task performance are properly managed, involvement and commitment to change initiatives become possible. Nonetheless, resistance to change is still one of the major hindrances that leadership encounters regardless of how well the process was started, conducted or concluded since change success depends on people and their perceptions and self-concept. A Harvard Business Review article of 2022 by of Timothy Clark underlines

people's need of psychological safety when an organization implements agile methods, tools and techniques as part of its change management drive. In its absence behaviors like routine seeking, negative emotional reaction to imposed change, a short term focus, fear of competence loss, risk aversion visible in the tendency to overvalue "sunk costs" over "opportunity costs", cognitive rigidity become tell-tale signs individual behavior most commonly associated with resistance to change (Shaul, 2003).

Resistance to change can be triggered by various factors. An analysis of these and the identification of the measures that are adequate can help overcome it.

Some of the most important factors that make people raise boundaries when change is on the way are:

- lack of awareness and understanding of the purpose of change, its drivers or its envisaged, tangible outcomes, or poor description of individual roles and responsibilities related to the change process,
- feeling of losing control, related to the amount of input people contribute to the change initiative, or, self-beliefs at a high level while outcomes are not sensed as desirable because of individual lack of involvement in their generation,
- lack of support on behalf of key figures in the organization,
- threat to existing status quo as far as people's power, career, knowledge, skills, work patterns, working relations are concerned leading to alienation, distrust and hence their sub-optimal performance of current or future tasks,
- lack of time to assimilate the change which makes the change initiative an error free environment running counter the the very fact that to change is to learn and to learn is to make errors and learn from them. If people are not granted the freedom to make mistakes when required to make changes, nor allowed to learn from them, then the change initiative is prone to failure of false positives,
- lack of incentives and rewards in accordance with what each and every individual

values and not in a non-discriminatory manner leads to disengagement in the long run.

Resistance to change takes various forms and their correct identification and adequate approach are required.

On one hand, there may be people who are not necessarily against the change, but they feel the need to question the need for change, challenge or openly disagree with the solution identified as optimal for implementing the change, or propose alternative courses of action. In such cases, listening and discussing are necessary. Involving these people, if appropriate, in the first stages of the initiative could be a good approach. Also, challenging their attitude and opinions is worthwhile if the concerns they express are related to the reasons for which the change initiative is adopted. On the other hand, there may be managers or employees who show covert or overt resistance by ignoring the activities/ meetings, claiming to be too busy to attend meetings or training events, withdrawing/withholding/stalling the allotment of resources allocated for the change initiative. Mitigating the concerns of these people is

one possible strategy. However, if that takes too much time from the activities to be undertaken to secure the success of the change initiative, then appealing to the person in power to address the issue, as a last resort, is the best.

In conclusion, leadership is required to provide vision, to self-develop and develop people's skills, to secure resources, to incentivize and to use action plans in order to manage change. They also need to be aware that change is very similar to an iceberg and, inherently, regardless of the type of change they are in charge that has ramifications all across the iceberg. Additionally, for change to work, a value focused approach is essential. That impacts people's empowerment strategies, leadership's role as an isle of stability while sailing through the waves of change, and leadership's capacity to identify and keep valuable legacy systems while discarding outdated systems and practices.

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