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Efficiency of the Control and Command System in Crisis Management

Abstract: The article presents conclusions (theses) from research in the area of crisis management systems. The first part presents the issues of system definition, crisis management, and the crisis management system. In the following part, the concept of a control and command system in crisis management is defined as a project for further discussion among scientists dealing with crisis management. The principles of coordination, synchronization and cooperation in crisis management are also discussed. The aim of the research was to define the elements (subsystems) of the control and command system in crisis management. The following question was posed as the main research problem: 'What elements (subsystems) should form a control and command system in crisis management to ensure its efficient functioning?' The article presents the results of the research.

Keywords: *control and command system in crisis management, command system, crisis management, coordination, synchronization and cooperation in crisis management*

Introduction

The complexity of the real world and its structuralism imply the application of the systemic paradigm to be used in its description (Sienkiewicz, 1994, p. 16 and 266; Okoń, 1996, p. 95).

The primary aim of crisis management is to ensure security for the population inhabiting a given territory by minimization of potential threats, efficient and effective performance of actions in the case of occurrence of threats, gaining a considerable advantage over them, and restoring the state prior to the crisis. Efficient and effective performance of actions, to

a great extent, will depend on the skills, competences and knowledge of persons in charge of the actions, and those participating in rescue operations. It should be remembered that crisis management is not a temporary measure occurring only in emergency situations, but it is a permanent and continuous operation. Therefore, great emphasis should be placed on the preparation of people in charge of actions, as well as those participating in rescue operations in the event of emergency situations. These consist of the planning of actions, allocation of responsibilities and competences, selection of technologies, appropriate spatial planning and an effective security system. While conducting actions, it is very important that both the commander and the person conducting the rescue operations possess appropriate experience, skills, and competences.

Research methods

In order to solve the main research problem and verify the adopted hypotheses, the following theoretical and empirical research methods were applied which included analysis, synthesis, generalization, and inference. The empirical methods used were: observation and diagnostic survey, and an expert survey technique using a questionnaire as a research tool. Empirical studies were carried out during command and staff training under the code name 'Ring' ('*Pierścień*'), and defence training conducted in the counties of Pułtusk and Ciechanów.

Concept of the system in theory and practice

Conducting considerations in the area of the control and command system in crisis management should start by defining the concept of the system itself. The concept of a system is widely interpreted and variously presented by many researchers in all publications concerning a 'systemic' approach to a slice area of reality.

Today, in a general sense, the system is defined as:

- a set of elements which have a specific structure and constitute a logically ordered whole, a set of multiple devices, roads, cables, etc., functioning as a whole; organs of other parts of a live organism which together perform a specific function; an ordered set of statements and attitudes creating a certain theory, a certain way of performing a specific activity, or principles of organizing something; a form of political system of a state; a group of rocks formed in one geological period, *log.* a comprehensive and structured set of sentences linked together by relations of logical consequence (Słownik Języka Polskiego);
- a purposefully specified *set of elements and set of feedback connections between them which jointly define the characteristic features of the whole.* Defining the system consists in distinguishing the: elements of the system environment, essential feedback connections between system components, and essential connections of the system with its environment. A system is an organized object operating in a specified

environment and consists of smaller components – subsystems. Subsystems are systems within a wider system, which are linked by many cooperative relationships in such a way that each of them pursues a main goal and contributes to the success of the whole (Encyklopedia Zarządzania);
- a coordinated assemblage of elements is a set creating a certain whole conditioned by a constant, logical arrangement of its components; a concept of such a whole (Słownik Wyrazów Obcych, 1980, p. 723).

In the praxeology and theory of management systems are:
- elements (at least two) interconnected by relationships which create a whole that is qualitatively different from the sum of the elements; a set of elements with a specified structure creating a whole with characteristics features different than those of the elements (Pszczołowski, 1978, p. 237).

In the Lexicon of Military Knowledge a system is defined as:
- any set of elements, internally coordinated and showing a specified structure; a set of ways (methods) of acting, performing complex activities; overall organizational principles, standards and rules in a given domain; a comprehensive and structured set of tasks connected with each other by certain logical relations, praxeology and cybernetics dealing with the scope of problems concerning a system in the most general sense (Leksykon Wiedzy Wojskowej, 1979, p. 426).

Systems operate in a certain specified arrangement called a structure. Due to this structure, subsystems and supersystems can be specified. In order to function efficiently, a system is subject to the so-called 'methodological rigour'. Namely, the point is that the system should be defined in a precise, unchangeable, complete and functional manner. A system is defined as a complex set of the above-mentioned elements, and a set of feedback connections taking place between these elements. While defining a system, the following should be distinguished: elements of its environment, and essential connections between subsystems which function as a unitary whole. When investigating and describing systems, one should specify input and output of the system. A system is nothing but a complex of elements integrated into a whole. It is considered that each system should possess a set of features, characteristic and unique properties, and fulfils specified functions. A systemic approach and systemic studies are very frequently applied in the world of science (Szymaniak, nd.).

In the above-mentioned definitions, as well as other definitions found in literature, certain common features may be observed, e.g.:
- a system is a set of connected elements;
- a system is connected with the environment;
- a system may be an element of a higher order system;
- an element of a system may be a lower order system.

Based on the possessed knowledge and the content of definitions found in literature, the researcher proposes to adopt the following definition of a system:

A system *is an identifiable set of elements (material or abstractive) functioning in their environment, interconnected and considered as a whole from a specified point of view, while at the same time, possessing such properties, which its elements do not have.*

Hence, the systemic approach implies perception of the system of control and command in crisis management through characteristic systemic features:

- the examined object is a system;
- the examined system consists of interconnected subsystems;
- the examined system is a subsystem of a higher order system;
- the examined system may be presented in the form of a model of a system

enabling the recognition and understanding of the essence of its functioning (Sienkiewicz, 1994, p. 16–18).

While creating various types of systems, one should remember about the rigour of systems methodology:

- precise – to know what belongs to them and what does not. Definition of the system can even be very general; however, it cannot be vague;
- unchangeable – in the entire course of considerations, in order that the changes taking place fall within the definition. It is unacceptable that certain elements are once approached as belonging to the system, and sometimes as not belonging to this system;
- complete – the division of a system into subsystems should be complete, i.e. the system cannot contain elements which do not belong to any of its subsystems;
- functional – systems should be distinguished on the grounds of the functions performed, and not because of spatial separation (Mazur, nd.).

Crisis management in theory and practice

Based on studies concerning the scope of problems of national security, we can safely pose the hypothesis that the essence of national security are individual elements which function in subsystems together with information links between them, and the decision-making and IT centre. The task of the element responsible for management (management subsystem) is to control the work of the whole system, and to coordinate the operation of its individual elements in order to prevent risks, management of occurring crisis situations, and removing the consequences of the crises. Summing up it may be stated that crisis management from a systemic perspective (crisis management system) is in the full sense of the word an element (subsystem) of the system of national security.

As in any case when various definitions are considered, there are also many definitions of crisis management. 'Crisis management is the management of an organization (system) under pressure, implemented to resolve tense situations, the task of which is to prepare and undertake actions aimed at preventing, counteracting and reacting in the event of

disturbances in the stability of the organization (system), and restoration of the normal state of its functioning' (Nowak, 2007, p.43).

In Article 2 of the Act on Crisis Management (2007), the legislator defines crisis management as: '…activities of public authorities which are an element of national security management consisting in the prevention of crisis situations, preparation for taking control of them through planned activities, reacting in the case of occurrence of crisis situations, and removing their effects, as well as the restoration of resources and critical infrastructure'.

Organization of the system of crisis management is based on the following principles (Gryz & Kitler, 2007, p. 203):

- the principle of the primacy of one-person management which consists in conferring decision-making competences on one-person bodies which wield general authority within a given scope of competences (commune's top executive, town's top executive, city's top executive, Chairman of the County Council, province governor, the Council of Ministers (Prime Minister);
- the principle of the liability of public authorities which, as a rule, are responsible for management in crisis situations by government and self-government administration bodies functioning in the State. This principle is associated with a constant, historically-conditioned, basic role of administration, which comes down to the removal of threats and provision of safety within the scope of the authority entrusted to it;
- the principle of the primacy of the territorial system which specifies that the basis for the operation of the authorities, is the territorial division of the State – commune, county, province), and reduces the branch system to an auxiliary function;
- the principle of universality which obliges all entities of State law operating in a given area (citizens, non-governmental organizations, inspections, services and guards) to participate in anti-crisis measures, each according to its legal and organizational status;
- the principle of a functional approach consists in the determination of relatively by their type and character, aimed at constant, usually repeatable, typical and procedurally formalized activities, distinguished on the grounds of the implementation of security objectives;
- the principle of reinforcement by which general administration bodies (commune head, mayor and provincial governor) are given authority – in accordance with the rules laid down by law – over all other forms of both combined and non-combined administration;
- the principle of continuity in the functioning of the State maintains that, irrespective of the state and circumstances of the functioning of the State, the organizational forms of State power remain unchanged, and individual bodies perform their functions in times of peace, crisis and war.

Analysis of the definition of crisis management leads to the statement that it is (Gryz & Kitler, 2007, p. 33):

- an integral component of the system of national security;
- activity aimed at the reduction of the probability of the occurrence of crisis situations, and in the event of their occurrence, taking control and restoring and maintaining the normal state;
- deliberate action and management in the state of threat;
- a process consisting of four phases: planning, organization, motivation, and control, which express themselves by prevention and preparation for possible crisis situations, reacting (solving) in the case of their occurrence and restoration as a return to the state of normal functioning (Sobolewski et al., 2011, p.22).

Both concepts, i.e. systemic approach and crisis management, do not belong to the same semantic set, because the term 'system' is perceived structurally and functionally only by one of the parties, and crisis management may be identified as multi-party, bilateral or multilateral.

The environment (of national security) consists of many operating systems, each of them pursuing other goals. The boundaries between individual systems are often imprecise, and their elements are sometimes too generally specified. When any organized whole is approached as a system, this leads to the conclusion that one can distinguish operating systems, and the systems which are not operating systems, so-called general systems. Operating systems are differentiated from general systems by the fact that people act within them as operating entities (Huzarski & Kaczmarek, 1997, p. 23).

In the case of national security, as well as in crisis management, the concept of a crisis management system may be defined, which includes any elements and subsystems interacting with each other, functioning, striving to achieve the goal which is minimalization of threats, reacting to them, and removal of their effects as quickly as possible.

Eugeniusz Nowak defines the system of crisis management as follows (Nowak, 2007, p. 46): '…thus, a system of crisis management will be called a system that can be separated from the whole of: management bodies; information links indispensable for implementation of the management process; methods and actions regulating the way and principles of the functioning of a given organization in accordance with the set goals; it is a dynamically changing system over time, and driving force behind the changes, concerning all its elements are managing bodies'.

The Government Centre for Security classified into the crisis management system the following elements (Rządowe Centrum Bezpieczeństwa, nd.):

- crisis managing authorities;
- consultative and advisory bodies competent in matters of initiation and coordination of actions undertaken within crisis management;
- crisis management centres, maintaining 24-hour readiness to undertake actions.

It can therefore be stated that the Legislator in the division of the crisis management system fails to notice the system of control and command in crisis management. While constructing a given system it should be remembered that it should include minimum two executive subsystems, and one subsystem controlling these subsystems. Therefore, based on the presented study, it is considered that there should be added to the crisis management system a subsystem of control and command, in order to fill the resulting gap and improve the functioning of the crisis management system.

Efficient flow of information between bodies and structures responsible for crisis management is primarily intended to counteract crisis situations, and in the cases when such situations occur, an effective removal of their effects. Today, information decides about the way of using the possessed resources and possibilities, about capabilities for adjustment to new conditions, and programming development in the process preceding the occurrence of a crisis situation. Each entity involved in crisis management should know its information requirements and know what information is needed to create plans, gathering resources, and performing basic functions and actions.

Information which conditions the efficiency and effectiveness of the crisis management system are important. Authorized entities/organizational units at all levels of crisis management must adjust to the changes taking place in their environment (internal and external) and must solve increasingly difficult and increasingly more complex problems associated with the occurring military and non-military threats. On each level of crisis management, there should function a system for warning and signalling dangers (threats), which would allow the recognition of threat and undertaking appropriate actions. In the contemporary world, only automated crisis management systems will guarantee the speed of obtaining, processing and transferring any information to various entities participating in the control of a given threat (the present situation in Ukraine confirms the thesis posed).

At the Institute of Security Sciences, the President Stanisław Wojciechowski University in Kalisz there is a laboratory for automated crisis management systems.

The Crisis Management System JASMINE (CMS JASMINE) is an innovative and extensively operating solution, dedicated to the structures of the national crisis management system, NATO and the EU. It ensures efficient and effective national security management, including crisis management, through complex support of actions by public administration bodies and the Armed Forces of the Republic of Poland (including units of the Territorial Defence Forces) during rescue and/or crisis situations and preventive actions. This system supports the processes of management, planning, command and control, as well as the monitoring (imaging) of actual threats of a non-military character and political-military character. The Institute's Laboratory for Automated Crisis Management Systems, among other things, enables:

- planning, support, control, coordination and control of operating actions, and inspection through, among other things: the mechanism of optimization of solutions (calculation, verification and simulation tools), dynamic creation of compilation

of forces and resources, development of variants of actions, logistic security plans, etc.;
- ongoing collection, processing, aggregation and distribution of information concerning the conducted rescue operations regarding: incidents, events, threats, information about the area, data about the population, and information about resources;
- automatic and ongoing reporting concerning the status of the conducted operations, and available resources in rescue teams;
- efficient communication with selected addressees (structures, military units and their headcounts, and if necessary, the dissemination of information important at the moment (alarms, various types of threat notifications, commands, dispatches, reports, etc.), virtually to any destination about the current location;
- cooperation with the systems of other departments (including: the Government Centre for Security, Institute of Meteorology and Water Management, State Fire Service, Police, National Emergency Medical Services, Border Guard, etc.), by using an Internet centralized portal – the Web Client service, which enables, among other things, document sharing, and automated two-way data exchange with the CMS JASMINE;
- imaging and monitoring on digital base maps of actual rescue/emergency situations, based on GPS information, data entered by, among others, soldiers, officers and rescuers, as well as videos and photos from the scene;
- integration and cooperation with unmanned aerial vehicles on live video transmission from territories/areas under quarantine, search and rescue operations, fires, floods, etc.;
- modular system architecture providing dedicated client and server software, functionalities and services for local staff (implementing the process of crisis management) and remote (operating in the field), as well as allowing flexible and easy expansion by new possibilities and additional workplaces;
- extensive system interoperability guaranteeing the exchange of information with the systems of the Ministry of National Defence, NATO and EU, due to the implemented standards: MIP DEM B3.1, NFFI and FFI-MTF (STANAG 5527), Link 16 – JREAP-C (STANAG 5516 i STANAG 5518), VMF, NVG and JIPS, ADatP-3 (B11C/F, B12.2, B13.1 i B14) – STANAG 5510, JDSSEM (STANAG 4677), BRM (author-designed and unique protocol of data replication on narrowband means of communication), HLA, DIS, SMTP, CBRN (ATP45), OTH-GOLD, WMS and WMF, and APP-6(A)/(C);
- wide range of network services: voice calls in IP technology (Voice-over-Internet protocol (VoIP), video conferences (Video Teleconferencing VTC), audio-video streaming (Real-Time Messaging Protocol RTMP), electronic mail (e-mail), Internet portal, text chats (CHAT), FAX, etc.;
- automatic and effective exchange of information by any radio means (also in channels with low bandwidth and high interference);

- use of available telecommunication media, e.g. mobile networks GSM/LTE/CDMA and public networks PSTN and VoIP;
- management of all system resources (services, ICT devices and user accounts);
- automated mechanisms and data replication and archiving services (of all events) in the whole system;
- the ability to quickly and conveniently attach rescue and crisis services to the system by using mobile applications installed on modern smartphones, which enables considerable automation of the process of obtaining information directly from, e.g. rescuers involved in an action;
- monitoring of persons in quarantine by tracking their whereabouts;
- cooperation with simulation systems enabling: multiple replays of many different variants of actions, situations, behaviours, and effects of decision-making, and an effective implementation of training for users in the effective use of the system, and preparation for the elimination and/or minimization of the effects of practically any crisis event.

The Laboratory makes it easier for students/doctoral students to become acquainted with the system, its software, and enables testing of individual applications. During classes, the users undergo basic training, learn to log into the system, use the available services, tools and mechanisms (including distance and area measurement, assessment of floodplains, the propagation of radio waves, etc.), assess the environment (using a 3D view), draw the operational situation, send information to other users of the system (e.g. np. via CHAT and e-mail), simulate activities and develop operational scenarios of crisis situations, or options of interoperability with the military system within the scope of problems concerning support of the stay and actions of allied troops on the territory of the host (*Host Nation Support – HNS*).

Apart from didactic activity, the Laboratory also significantly supports the research activity of the Institute of Security Sciences. Researchers from the Institute carry out studies within the area of widely understood crisis management using the Laboratory in question. Observation of defensive trainings and activities performed by students, as well as the results of their performance, are an important element of research conducted at the University, and the results are cyclically presented during symposia and scientific conferences taking place at the University, and published by scientific publishers.

Studies carried out in this area showed that that there is no entirely efficient flow of information between all bodies and structures responsible for the circulation of information in crisis management. If we also analyze the environment (NATO, EU, Poland) in which the functioning of crisis management system in military and non-military threats is possible, considerable problems may emerge (lack of exchange of information) in the removal of the effects of these threats.

The environment in which the crisis management system functions consists of many operational systems, and each of them pursues different goals. In the holistic approach, the

crisis management system remains in close correlation with the remaining subsystems of the security and defence system, and the strength of these connections depends on the functioning of the State in one of the situations (peace, crisis or war). The strength of each system, in this case the crisis management system, depends on the coordination and cooperation of all participants within the system.

Uploading the system is the concept inseparably linked to action, especially with the activities of complex entities as a praxeological approach to the issues of integration, harmonization and efficiency.

Tadeusz Kotarbiński identifies the integration of activities by merging the components into a whole most useful for the purpose (Kotarbiński, 1973, p.202). In the holistic approach, integration activities are perceived as building a whole from parts, and maintaining it as an efficient whole. Kotarbiński recommends an integration of all elements indispensable for the functioning of the whole, and the exclusion of those which are not indispensable or even disturbing. In this approach, integrating activities can be a step in the creation of complex actions covering operation of the spectrum of elements in pursuit of a common goal. As a complex of activities, Kotarbiński considers any complex object, the parts of which together form a whole with respect to the functioning for the common goal, understood in the praxeological sense as a component of action (Kotarbiński, 1973 s.17). Hence, the complexity of activities is considered from the material and functional aspects. On the one hand, this is constituted of the constituent elements (entities) of a larger, complex whole, and on the other hand, activities (actions) that are part of complex activities. A concept is created of a structurally and functionally ordered structure, consistent in its operation in achieving a complex goal.

The 'law of harmony' formulated by Karol Adamiecki at the beginning of the 20th century, widespread later by Jerzy Kurnal and Jan Zieleniewski, and repeatedly cited by theoreticians, refers to the area related to specialization as a proper sophistication in a given type of training (Zieleniewski, 1981, p.262). Specialization from this viewpoint is not a specialist activity requiring the possession of a narrow scope of competences, but a harmonized activity, conditioned by the possession of 'sophistication' in a given type of activity (synonymous with manipulative dexterity). Specialization in operational efficiency, specialization in streamlining operations, in achieving the optimum value of these activities, are among the main assumptions of specialization (Kotarbiński, 1966, p.206-207). In the efficiency of operations of complex entities, organizational paradigms play an essential role — coordination, concentration, and the above-mentioned integration.

Coordination is the precondition of a rational integration of actions and, in fact, it is the reconciliation of the actions of the elements of the whole, so that they do not interfere with each other in the pursuit of a common goal, but support their actions (Kotarbiński, 1973, p.207). By coordination is meant 'inclusion into action of all and only those elements (…), which are essential to ensure success, and including them in such a way that these elements maximally contribute as much as possible to the success of the whole (institutions,

team or their fragments) – hence, including them in proper quality and quantity, and at the right moment' (Zieleniewski, 1981, p.208). Coordination is inseparably connected with the goal of the actions as their most important determinant. After all, the purpose of an action is its effect, final effect, result of action; hence, despite diversity of operating entities, the coordination of actions aims at reconciliation (integration) of the effects of actions by separate parts of the whole. Coordination is 'the process carried out within the organization, integration of separate parts of the organization, a process determined by the main task and efficiency of its implementation' (Czupryński, 2004, p.32). This the process (functional) approach to coordination.

In the argumentative approach, coordination is a prerequisite for the existence of complex multi-entity activities. The elements of coordination are:

- operating entities;
- coordination entities;
- coordinator (coordination centre).

Operating entities will be: people, management, technical, administrative and manufacturing (service) organizational units.

Coordination entities are:

- time;
- resources (including information);
- techniques and methods of operation;
- and place.

The coordinator (coordination centre), on the one hand, is an operating entity as a management element, performing managerial functions, including the coordination function and, on the other hand, is an autonomous entity, separated from operating entities by the causative role. Good will alone and the resources of an organization are not enough for coordination, but still a coordinator is needed (Zieleniewski, 1981, p. 264). The coordinator entity may be omitted in self-coordination. This idea is based on the assumption of the occurrence of situational awareness, i.e. possession of such a permanent information resource that coordination takes place on the level of the goal of action, but not on partial actions. A place concerns physical conditions (the environment) of the occurrence of the phenomenon of coordination.

The conducted study shows the need for redefining the term 'coordination' of activities. Accordingly, while making a synthesis of the most important elements of the analyzed definition, the meaning of coordination was defined as: the whole of planning and organizational undertakings implemented in the process of preparation and carrying out of actions aimed at the creation of conditions for performance of tasks, synchronized in time and space by all entities/elements of crisis management (e.g. the Armed Forces of the Republic of Poland, Police, State Fire Service, Border Guard, Crisis Response Centres/Teams), and using their different potentials and capabilities in order to achieve the highest effectiveness of actions.

In addition, analysis of the above-mentioned definition allows the conclusion that the essence of coordination of actions consists in:

- identification of executors and the division of tasks between them according to their specialties and capabilities;
- maximum use of capabilities of individual contractors;
- operation of individual contractors, approaching the whole to achieve the assumed goal of the action (Lidwa, 1999, p. 98).

The conducted study also indicates the following conditions which should be fulfilled for proper coordination:

- actions are carried out by a team consisting of at least two entities;
- there should be one superior centre to which organizational entities are subordinated;
- the superior centre has 'authority' over subordinated centres.

According to the so-formulated cooperation conditions, the thesis may be posed that coordination may occur in any organizational structure – a team.

In the light of the results obtained so far, with respect to the essence of coordination, defining its purpose becomes extremely important. Wanting to precisely formulate goals which will be set before coordination within actions, it is advisable to follow the reflections on their essence.

Summing up, coordination is the process of harmonizing the efforts of many entities aiming to achieve the main goal of organization. However, the goal may be perceived in a strategic, operational, or tactical dimension. Coordination has a time, spatial, methodological and attribute-based dimension.

Quite often, many people confuse the concepts of coordination, synchronization and concurrence of joint action (cooperation), which are terms that occur in all team actions aimed at a common goal. Another term that occurs quite often in the context of coordination, is synchronization. The dictionary of the Polish language defines this as: *bringing two or more phenomena, processes, activities, etc., to the compliance of their course over time*.

Synchronization in the theory of organization, and management is *coordination over time and refers to both to actions of the creator, taking into account other people acting at the same time, and to an agreed on time functioning of individual teams forming the organization, with consideration of the intervening influence of its environment* (Okoń, 1996, p. 190).

From the above, it follows that synchronization is coordination in time. Thus, synchronization is a higher-quality stage of coordination. It may also be concluded that *each synchronization is coordination; however, not every coordination is synchronization.* This also means that coordination is the warp, the basis of synchronization. In practical implementation, synchronization is more difficult than coordination, because more time dependencies have to be taken into account.

The complexity of coordination, cooperation and synchronization, contributes to the formation of specific relations and areas mutually complementary within activities of

multi-entity organization. The conducted analyses indicate that cooperation takes place when the following conditions are satisfied (Pszczołowski, 1978, p. 108):

- there occur at least two autonomous entities;
- a consistent or common goal of action is defined;
- entities knowingly consent to participate in the achievement of a common goal, or the goal of one of them;
- at least one party must undertake actions supporting the actions of the other party.

This means that there is no subordination between the cooperating units, but equivalence which preserves their autonomy. In turn, coordination concerns actions within an own group. All activities rely on defining and establishing arrangements and mutual dependencies between the elements of the group (Huzarski, 1999, p.68). A thesis may also be posed that cooperation between independent entities is the consequence of coordination of actions of the superior commanding them.

System of control and command in crisis management – project

The system of control and command in a crisis situations is a set of elements organized in the form of control and command bodies of decision-making centres for crisis management, means of control and command and information, and the decision-making process combined by control and command relations, with the entire logistics security infrastructure, cooperating with each other according to the adopted and previously arranged principles and requirements.

For efficient control and command in crisis situations, a system is organized which is an integral part of the system of actions using forces and means used during crisis management in times of peace and crisis, as well as war. It consists of functional and internally coordinated organizational, human and material elements, mutually connected and dependent on each other. The elements of the system of control and command in crisis situations may be grouped into the following components:

- organization of control and command;
- means of control and command;
- the decision-making process.

While referring to the **organization of control and command**, the following content is included in this concept:

- the general principles of the operation of individual organizational elements of the system of control and command (distribution and dislocation of decision-making centres – command and control positions);
- organizational and functional structure of decision-making centres of crisis management;
- relations (external and internal connections) between individual decision-making centres;

- powers and responsibilities of decision-making centres/crisis management commands;
- division of decision-making centres into control and command positions.

In turn, **means of control and command** are technical and material resources dedicated to their use in the crisis control and command system, organized into technical infrastructure, control and command positions, telecommunication, information technology, mail, signalling, command support networks, including, among others:

- communication means and equipment integrated in the form of communication centres and command stations and vehicles, command and staff vehicles, and echelons;
- automated systems of control and command;
- office supplies;
- means of transport, technical and organizational means, etc.

In turn, the **decision-making process** is understood as an information and decision-making process implemented in decision-making cycles by decision-making centres, located in the network of control and command positions at their organizational level, consisting in cyclic collection and elaboration of information, and subsequently, their processing into decision-making information which, in the form of a task, are delivered to executors. This process should be compatible with the decision-making process in the Armed Forces of the Republic of Poland, NATO, and the EU.

The thus understood control and crisis management control and command system should provide: the service life of decision-making centres of crisis management, the capability for cooperation, coordination and synchronization of actions with other decision-making centres of crisis management, types of armed forces, components of armed forces of allied countries, Polish Police, National Fire Service, Border Guard, Prison Service, county and country administration of possible areas of activity; responsiveness, and adapting to the needs of command according to the conducted type of actions. The system of crisis control and command management is an integral part of the security and defence systems of the State.

Each organizational structure, including crisis decision-making centres and control and command positions should, theoretically, satisfy their organizational and managerial basic requirements:

- provide the realization of goals;
- be a sufficiently durable structure to enable its uninterrupted operation;
- facilitate the adaptation of command to changing external conditions.

The first of these requirements is especially important, because there is no activity which would not strive towards the realization of a specified goal or goals. It is the goals that set the direction and structure of actions in each situation. Therefore, the realization of goals is the reason for the existence of all institutions, and the degree of this realization is the measure of their success, and consequently, the ultimate criterion of the degree of their organization (Kotarbiński, 1966, p. 120–122).

Conclusions

While analyzing the above-mentioned contents, the researcher recommends making the following assumptions for further consideration in the elements of the control and command system in crisis situations. The structure of the crisis management system should reflect its organizational shape, i.e. mutual position and form of the connections between its separate elements and subsystems, as well as the environment in which it will during military and non-military threats.

The elements (subsystems) of a crisis management system are:

- crisis management bodies;
- consultative and advisory bodies competent in the matters of initiation and coordination of actions undertaken within crisis management;
- crisis management centres maintaining 24-hour readiness for undertaking actions;
- a subsystem of control and command in crisis management.

Control means to act on someone or something that causes someone (or something) to behave in accordance with the will of the instigator (goal of the organization). In an organization, control is associated with a direct relationship and contact between the superior and the manager of a team or its members, and means an appropriate impact on people (contacting them, providing information, motivating them to work, controlling achieved and archival results, etc.), behaving in accordance with the will of the goals of the organization.

Command is through the commander, who has the authority, makes decisions with a special order of enforceability, aimed at achieving the intended goal by using available forces and resources.

The subsystem of control and command in crisis management is a set of elements organized on the form of control and command bodies of crisis management decision-making centres, means of control and command, and the information and decision-making process connected with control and command relationships with the whole logistic security infrastructure, cooperating with each other according to accepted and previously agreed principles and requirements. Elements of the control and command system in crisis situations may be grouped into the following components:

- organization of control and command;
- means of control and command;
- decision-making process.

The essence of coordination consists in the performance of specified activities (action arrangements) in the process of planning and organization, as well as management of actions by a multi-entity organization, thus, causing the effect which (the end result, the desired state) is the achievement of the goal of the actions. The state expected by the coordinator, therefore, is such an arrangement of the subordinated elements that the result of mutually-cooperating effects, is higher than the direct sum of actions by each one separately.

The results of analyses and evaluations demonstrate that the effectiveness of the teamwork understood as achieving the assumed goals depending on how the decision-making centres of the organization, fulfil their tasks. If efficiency is the ability to choose the right goals, and subsequently transform them into appropriate tasks and divide them between the creators, it is closely related to the effectiveness of actions.

The Author invites everyone engaged in studies in the area of crisis management to join the research team at the Institute of Security Sciences at President Stanisław Wojciechowski University in Kalisz for further research in this area. He also welcomes an exchange of scientific opinions in the investigated area in the journal, as well as during scientific conferences.

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