



UDC 351.378

Terentieva Anna Valeriivna,

Doctor of Public Administration, Full Professor, Senior Researcher, Head of the Department of public service, administration and training on the international projects, Institute of Public Administration in the Sphere of Civil Protection, 04074, Kyiv, Str. Vyshhorodska, 21, tel.: (044) 468 91 84, e-mail: teren_a@ukr.net

ORCID: 0000-0003-3881-5865

Терент'єва Анна Валеріївна,

доктор наук з державного управління, професор, старший науковий співробітник, завідувач кафедри державної служби управління та навчання за міжнародними проектами, Інститут державного управління у сфері цивільного захисту, 04074, Київ, вул. Вишгородська, 21, тел.: (044) 468 91 84, e-mail: teren_a@ukr.net

ORCID: 0000-0003-3881-5865

Терентьева Анна Валерьевна,

доктор наук по государственному управлению, профессор, старший научный сотрудник, заведующий кафедрой государственной службы, управления и обучения по международным проектам, Институт государственного управления в сфере гражданской защиты, 04074, Киев, ул. Вышгородская, 21, тел.: (044) 468 91 84, e-mail: teren_a@ukr.net

ORCID: 0000-0003-3881-5865

DOI: 10.32689/2617-2224-2018-15-5-246-255

SYSTEM ANALYSIS AS A METHOD OF DECISION MAKING

Abstract. The current system of public administration, which is endowed with administrative and legal authorities, cannot completely fulfill its task of protecting the population and territories from emergency, so it is urgent improvements in prevention and elimination of emergency.

System approach to management – this is not a set of rules or guidelines to be followed by managers, and the general way of thinking and approach to organization and management. The essence of the system approach is to find a simple to complex, decomposition of the problem into its component parts.

The purpose of using systems analysis concerning the specific problem is to increase the degree of validity of the decision taken, the expansion of a variety of options, including the selection, while indicating ways of discarding options that are inferior to others.

System analysis which used in solving such problems as the distribution of resources between departments, determine future needs for new equipment and workers of different skill forecasting the demand for various types of works in emergencies.

Reducing the time for development, adoption and implementation of management decisions, increase uncertainty and risk, the need to attract additional resources from the reserves, the availability of different modes of functioning of the public administration in emergency suggest that governance in this area has certain peculiarities. Taking them into account in the work of public administration in emergency will enable to reduce the likelihood of inappropriate decision-making, will help save resources and time in emergencies, and reduce losses.

Thus, the basis of decision-making using system analysis is the general approach used by managers, considering the influence in each particular situation of all factors: technical, economic, social and psychological.

Keywords: systematic approach, decision-making, analysis, decision, emergency, factor.

СИСТЕМНИЙ АНАЛІЗ ЯК МЕТОД УХВАЛЕННЯ РІШЕНЬ

Анотація. Сучасна система державного управління, яка наділена адміністративно-правовими повноваженнями, не може певною мірою виконати покладені на неї завдання щодо забезпечення захисту населення і територій від надзвичайних ситуацій, тому актуальним є її удосконалення у сфері запобігання та ліквідації надзвичайних ситуацій.

Системний підхід до управління — це не набір правил чи принципів, якими мають керуватися управлінці, а загальний спосіб мислення і підходу щодо організації і управління. Суть системного підходу полягає у пошуку простого у складному, декомпозицією проблеми на складові.

Метою використання системного аналізу до конкретної проблеми є підвищення ступеня обґрунтованості рішення, що ухвалюється, розширення безлічі варіантів, серед яких проводиться вибір, з одночасним зазначенням способів відкидання варіантів, що поступаються іншим.

Системний аналіз набув значного поширення при вирішенні таких завдань, як розподіл матеріальних ресурсів між структурними підрозділами, визначення майбутньої потреби в новому обладнанні і працівниках різної кваліфікації, прогнозування попиту на різні види робіт в умовах ліквідації наслідків надзвичайних ситуацій.

Зменшення часу на розроблення, прийняття та реалізацію управлінських рішень, зростання невизначеності та ризику, необхідність залучення з резервів додаткових ресурсів, наявність різних режимів функціонування системи державного управління в умовах надзвичайних ситуацій свідчать про те, що державне управління у цій сфері має певні особливості. Їх урахування в діяльності органів державного управління в умовах надзвичайних ситуацій дасть можливість зменшити вірогідність прийняття неадекватних управлін-

ських рішень, сприятиме економії ресурсів та часу на ліквідацію наслідків надзвичайних ситуацій, зменшенню збитків.

Таким чином, в основі ухвалення рішень з використанням системного аналізу лежить загальний підхід, який використовують керівники, розглядаючи вплив у кожній конкретній ситуації всіх факторів: технічних, економічних, соціально-психологічних.

Ключові слова: системний підхід, рішення, аналіз, прийняття, надзвичайна ситуація, фактор.

СИСТЕМНЫЙ АНАЛИЗ КАК МЕТОД ПРИНЯТИЯ РЕШЕНИЙ

Аннотация. Современная система государственного управления, которая наделена административно-правовыми полномочиями, не может полностью выполнить возложенные на нее задачи по обеспечению защиты населения и территорий от чрезвычайных ситуаций, поэтому актуальным является ее совершенствование в сфере предупреждения и ликвидации чрезвычайных ситуаций.

Системный подход к управлению — это не набор правил или принципов, которыми должны руководствоваться управленцы, а общий образ мышления и подхода к организации и управления. Суть системного подхода заключается в поиске простого в сложном, декомпозицией проблемы на составные части.

Целью использования системного анализа применительно к конкретной проблеме является повышение степени обоснованности решения, принимается, расширение множества вариантов, среди которых производится выбор, с одновременным указанием способов отбрасывания вариантов, уступают другим.

Системный анализ широко распространен при решении таких задач, как распределение материальных ресурсов между структурными подразделениями, определение будущей потребности в новом оборудовании и работниках различной квалификации, прогнозирования спроса на различные виды работ в условиях ликвидации последствий чрезвычайных ситуаций.

Уменьшение времени на разработку, принятие и реализацию управленческих решений, рост неопределенности и риска, необходимость привлечения из резервов дополнительных ресурсов, наличие различных режимов функционирования системы государственного управления в условиях чрезвычайных ситуаций свидетельствуют о том, что государственное управление в этой сфере имеет определенные особенности. Их учета в деятельности органов государственного управления в условиях чрезвычайных ситуаций позволит уменьшить вероятность принятия неадекватных управленческих решений, способствовать экономии ресурсов и времени на ликвидацию последствий чрезвычайных ситуаций, уменьшению убытков.

Таким образом, в основе принятия решений с использованием системного анализа лежит общий подход, который используют руководители, рас-

сматривая влияние в каждой конкретной ситуации всех факторов: технических, экономических, социально-психологических.

Ключевые слова: системный подход, решение, анализ, принятие, чрезвычайная ситуация, фактор.

Target setting. Prevention of emergencies, liquidation of their consequences, maximum reduction of losses and losses is a national problem and one of the most important tasks of state administration bodies of Ukraine. This is due to the fact that the negative tendencies observed in recent years, including increasing the risk of emergencies of natural and man-made nature, significant material and social damage due to their increase in their number and scale, constitute a threat to national security in the economic, social and environmental spheres.

The modern system of public administration, which has administrative and legal powers, can not fully fulfill the tasks entrusted to it in ensuring the protection of population and territories from emergency situations, therefore, its improvement in the field of prevention and liquidation of emergencies is urgent.

Civil servants and policy makers are compelled to recognize the fact that conflicts and crises can potentially occur in any area of their responsibility. Crisis situations require their consistent efforts to restore public confidence and integrity of management mechanisms, while emergencies may also require efforts to limit the extent of damage to people, their property and the environment. Historical experience shows that the emergency is easily transformed into political crises and,

in turn, into political conflicts where power is losing control of the development of events.

Analysis of basic research and publication. Traditionally, it is believed that actions in the context of crises and emergencies are the prerogative of the executive authorities. At the same time, experts have tended to acknowledge the fact that the task of ensuring readiness for action under the appropriate conditions extends to all public authorities without exception, including legislative power, as well as non-governmental organizations and institutions. A condition for an adequate perception of this provision is a clear understanding of the nature of crisis and emergency situations in terms of functions and tasks of public administration [1, 2].

Modern development of Ukraine under the conditions of system transformation is characterized as permanently complex, and sometimes even with the failures of extreme. The global development of human civilization, in addition to positive achievements, has created numerous threats to the vital interests of man and citizen, society and the state. A significant place among these threats occupy the dangers of technogenic and natural spheres. Many of them are, to some extent, also inherent in Ukraine. In this regard, a major role in ensuring technological and natural safety is given to the Unified State

System of Civil Protection of Population and Territories [3].

The purpose of the article is to explore the possibility of using system analysis in the management of management decisions in the process of emergency response.

The statement of basic materials.

Holistic protection is carried out in order to implement state policy aimed at ensuring the safety and protection of the population of territories, material and cultural values and the environment from the negative effects of emergencies in peacetime and in a special period, overcoming the consequences of emergencies, in particular the consequences of emergencies in the territories of foreign states, respectively to international treaties of Ukraine, the consent of which is binding on the Verkhovna Rada of Ukraine.

The risks of emergencies of natural and man-made nature are a factor determining the quality of life in regions of any country. Unfortunately, for Ukraine, these risks are high enough, which predetermines the urgent need for a detailed elaboration of organizational and managerial approaches to solving this complex problem. All of the above leads to the recognition that traditional approaches to managing the management of coping with the complex consequences of emergencies, as proved by the experience of their use, often lead to unsatisfactory results. A serious problem with the organization of effective management of emergencies is the real complication or lack of coordination between official governmental, departmental and non-governmental bodies [4]. Traditional approaches to emergency management, as evidenced

by the experience of their use, often result in unsatisfactory results.

The search for solutions to this problem in the event of emergencies should be carried out not only due to the transformation of the existing functional structure and the improvement of the skills of the managerial staff, and the transition to a new management paradigm - a new system of views based on the basic provisions of strategic management, according to which the construction of the system Emergency management is an answer to the various environmental impacts inherent in nature. In this case, the system of emergency management is considered as an open system, and the basic conditions for its successful functioning should be determined not in its boundaries, but on the outside [5].

That is, the effectiveness of the system is associated with how accurately it reacts to the environment, how stable is it to unexpected changes in the environment, including strategic, how efficiently uses potential opportunities (reserves of different types).

The system approach is based on the theory of systems, which was first applied in exact sciences and technology, and in the late 50's – and in the theory of management.

A system approach to management is not a set of rules or principles that should be managed by managers, but a general way of thinking and an organization and management approach. The essence of the system approach is to find a simple in complex, decomposition of the problem into its components, up to the conclusion of simple questions such as “There is – need to be defined”.

The basis of system management review and emerging problems. In the course of its implementation, lies the concept of the system.

The system is a certain integrity, which consists of interrelated parts (elements), each of which contributes to the characteristics of the whole Automobile, computers, TVs — all these are examples of systems. Consequently, the system consists of many times, each of which works in conjunction with others, to create a whole that has qualities that are not in its constituent parts. However, the components of the system are interdependent. If at least one of them does not appear, then the whole system either will not work or will work incorrectly.

There are two main types of system: closed and open. The closed system has tight fixed boundaries, and its actions are relatively independent of the environment that surrounds the system. An example of such a system can be a clock that works independently of the external environment, as long as there is a spring or there is another source of energy.

An open system is characterized by interaction with the environment through the penetrating “boundaries” of the system (inputs and outputs) Through the inputs, the environment influences the system, and the system influences the environment through exits.

Large complex systems consist of bits, which can be considered, in turn, as systems These parts are called subsystems. The concept of subsystems is extremely important for management, since it enables to create inside the system the necessary structural units for

the needs of management: departments, sectors, sections, etc.

In this case, the subsystems, in turn, may consist of smaller subsystems (parts, elements). Since they are interdependent, the poor functioning of even the smallest subsystem can affect the system as a whole.

Therefore, systematic analysis is the most consistent implementation of a systematic approach to solving political, socio-economic, technical and other problems in various spheres of human activity.

The main features of system analysis are:

1. Involves the adoption of an optimal solution from many possible alternatives.

2. Each alternative is evaluated from a long-term perspective.

3. Considered as a methodology for in-depth understanding (understanding) and organizing (structuring) the problem.

4. In the system analysis emphasis is placed on the development of new principles of scientific thinking, taking into account the relationship of the whole and contradictory trends. Specifically — systematically, at all stages of the life cycle of any system, the comparison of alternatives is carried out, if possible in quantitative form, based on the logical sequence of steps.

5. The intuition of experts is sharpened.

6. Used primarily to address strategic issues.

Consequently, system analysis is a scientific method of knowledge, which is a sequence of actions to establish structural relationships between variables or elements of the system under

study, based on a complex of general scientific, experimental, natural-scientific, statistical, and mathematical methods.

The value of the system approach lies in the fact that the consideration of the categories of system analysis creates the basis for a logical and consistent approach to the problem of decision-making [6]. The effectiveness of solving problems through system analysis is determined by the structure of the solved problems.

All problems are divided into three classes:

- well-structured or quantitatively formulated problems in which significant dependencies are well understood;
- unstructured, or qualitatively expressed problems that only contain a description of important resources, features and characteristics, the quantitative relationships between which are completely unknown;
- ill-structured, or mixed issues that contain both qualitative elements and little-known, uncertain parties that tend to dominate.

In general, system analysis can be characterized as a methodology for solving large complex management problems. He investigates system objects using system principles and is intended to provide a reliable picture of the development and activities of an economic entity.

The purpose of using system analysis for a specific problem is to increase the degree of validity of the decision to be made, to expand the range of options among which the choice is made, with simultaneous indication of ways to discard alternatives that are inferior to others.

System analysis involves the use of both rigid quantitative methods, as well as logical judgments, experience and intuition. Using system analysis, you can investigate any problems, taking into account not only those factors whose influence can be quantified, as well as factors that can be evaluated qualitatively [5, 6]. Thus, the basis of decision-making using system analysis is the general approach used by managers, considering the influence in each particular situation of all factors: technical, economic, social and psychological. But at the same time the decision maker (DM) must take into account not only his subjective thoughts, but also the objective data obtained as a result of the research, which enables him to adopt the most rational and reasonable solution.

Characteristic features of system analysis are:

- since most decisions are addressed to individual elements of the system, then when solving problems it is necessary to take into account the interrelations of this element with others and the general purpose of the system (system approach). That is, the purpose of the system is the expected results of the practical work on the elimination of the consequences of the emergency, the achievement of which is directed at the efforts, and is a system-forming factor.

• the analysis at the initial stages is carried out for the whole complex of problems and is reduced to the level of their constituents. Studies are conducted using the methods used to study them.

- priority is attached to such factors as cost and quality of labor, so DM must have a clear idea of them;

- in many cases, already given analysis shows the way to an obvious solution, but the decision itself has to be adopted;

- system analysis does not replace logical thoughts, but is only an auxiliary element that enables you to identify the areas where the proposal can be used and to identify each of the possible solutions that the manager considers;

- provides compulsory use of computer technology;

- in some cases they can be used as technical means.

System analysis (as well as economic) also takes into account indicators based on accounting, reporting and plan data.

But for a thorough and in-depth study of the problem, it is necessary not only to use the data obtained as a result of the study of technical, economic, financial and other aspects of the activities in the process of eliminating the consequences of an emergency, as well as the psychological climate and social phenomena [6, 7]. In this regard, in the system analysis, the indicators acquire, in addition to quantitative characteristics, and also qualitative expression.

It should be noted that in the absence of the full amount of information and analysis itself, it is sometimes impossible to determine the factors of socio-political nature and moral factors. But they should pay attention to them and take them into account when making decisions.

In system analysis, you can identify not only the causes that cause any negative consequences, but also the conditions in which these causes occur. Therefore, it is necessary to provide for

appropriate measures to eliminate negative phenomena.

System analysis has become widespread in solving such tasks as the distribution of material resources between structural units, determining the future need for new equipment and workers of different qualifications, forecasting demand for various types of work in the context of emergency response [7].

System analysis is the most objective basis for making managerial decisions and allows to structure a certain problem on the basis of analysis of available information, including expertly obtained. Then, establish the relationships of the components of the problem, date, where possible, quantitative assessments, and thus translate the problem into a structured category. After that you can already use the mathematical modeling apparatus and the choice of the best solutions, the stages and sequencing of which are also often a sphere of application of the system approach.

The specific sequence of system analysis is determined by a researcher studying problems, and is largely individual in nature, which is determined by the problem under consideration. But at the same time, with all its diverse orientations and the absence of rigid frameworks, the system analysis contains typical moments, objective factors, including axiomatics, terminology, and scientific tools that are widely covered in sources of scientific information. The developed model of the investigated situation must have certain properties that are the conditions of significance of the model, such as:

- integrity, typeness, the presence of common properties and behavior in the totality of its elements;

- isolation, according to which the complex of objects creating the system can be considered in isolation from the environment (at the same time, the relative nature of this property is obvious);

- divisibility, which allows a holistic object to be considered as a set of elements;

- variety and identification, according to which all elements included in the system, have their own state and behavior, different from the similar characteristics of other elements, due to which it is possible to separate each element from others and study its features.

In this case, the systematic approach assumes that an object, which is analyzed as a system, has other properties than a simple sum of properties of its constituent parts.

Conclusions. Vital processes are the management decision-making in emergencies, for example, in the event of fires, catastrophes, natural disasters, when it comes not only to the optimum use of material and financial resources, but first of all about people's lives.

Reducing the time for the development, adoption and implementation of management decisions, the growth of uncertainty and risk, the need to attract extra resources from the reserves, the availability of different modes of operation of the public management system in the event of emergencies indicate that public administration in this area has certain features. Their consideration in the activities of public administration bodies in the event of emergencies will reduce the likelihood of inadequate management decisions, contribute to saving resources and time

to eliminate the consequences of emergencies, and reduce losses.

A systemic approach to management suggests that it can be investigated both in terms of content and in terms of its forms of manifestation. Goals, functions and methods of management in the complex characterize the content of the activity and can have different aspects. The defining aspect can be called methodological, reflecting a set of principles, laws and laws implemented in the management process and which can determine with which purpose, what and how should be influenced to achieve the desired result, including in the development of management decisions in the conditions of emergencies.

REFERENCES

1. *Larichev O. I.* (2000), *Teoriya y metodi prynyatyia resheniy* [Theory and methods of decision-making], Logos, Moscow, Russia.
2. *Guriev S. O., Terentieva A. V., Volyanskiy P. B.* (2008) *Kryzovyye menedzhment ta pryntsyipy upravlinnya ryzykamy v protsesi likvidatsiyi nadzvychaynykh sytuatsiy* [Crisis Management and Principles of Risk Management in the Process of Emergency Elimination], Kyiv, Ukraine.
3. *Poteryaiko S. P.* (2011) "Organization of state management in emergencies", *Investytsiyi: praktyka ta dosvid*, vol. 2, p. 94–95.
4. *Barylo O. G., Poteryaiko S. P.* (2015), "Approaches to risk management during emergency response tasks", *Investytsiyi: praktyka ta dosvid*, vol. 23, p. 144–147.
5. *Terentieva A. V.* (2009), *Upravlinnya nadzvychaynymy sytuatsiyamy* [Emergency management], Doctor Media LLC, Kyiv, Ukraine.

6. *Surmin Yu. P.* (2003), *Teoriya sistem i sistemnyy analiz* [Theory of systems and systems analysis], MAUP, Kyiv, Ukraine.
7. *Soroka K. O.* (2004), *Osnovy teorii system i systemnoho analizu* [Fundamentals of the Theory of Systems: Training. Guidances], KSAME, Kharkiv, Ukraine.
8. *Volyanskyi P. B., Hlovatskiy O. L., Guriev S. O.* et all. (2010), *Reahuvannya na vynyknennya nadzvychaynykh situatsiy* [Responding to emergencies], IPASCP NUCP, USPCEMA and DM, Kyiv, Ukraine.
3. *Потеряйко С. П.* Організація державного управління у надзвичайних ситуаціях / С. П. Потеряйко // Інвестиції: практика та досвід. — 2011. — № 2. — С. 94–95.
4. *Барило О. Г., Потеряйко С. П.* Підходи до управління ризиками під час виконання завдань з ліквідації надзвичайної ситуації // Інвестиції: практика та досвід. — 2015. — № 23. — С. 144–147.
5. *Терент'єва А. В.* Управління надзвичайними ситуаціями : монографія / А. В. Терент'єва. — К. : ТОВ “Доктор Медіа”, 2009. — 332 с.
6. *Сурмин Ю. П.* Теория систем и системный анализ [Текст] : учеб. пособие / Ю. П. Сурмин. — К. : МАУП, 2003. — 368 с.
7. *Сорока К. О.* Основи теорії систем і системного аналізу: навч. посіб. / К. О. Сорока. — Харків: ХНАМГ, 2004. — 291 с.
8. *Реагування на виникнення надзвичайних ситуацій* / П. Б. Волянський, О. Л. Гловацький, С. О. Гур'єв та ін. — ІДУСЦЗ НУЦЗУ, УНПЦ ЕМД та МК. — Вінниця, 2010. — 412 с.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

1. *Ларичев О. И.* Теория и методы принятия решений: учебник. — М.: Логос, 2000. — 296 с.
2. *Кризовий менеджмент та принципи управління ризиками в процесі ліквідації надзвичайних ситуацій: монографія* / С. О. Гур'єв, А. В. Терент'єва, П. Б. Волянський. — К. : [б. в.], 2008. — 148 с.