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System Approach to Investigation of Projects of Fire-Fighting Systems' Functioning and Development of United Territorial Communities

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Summary. The necessity of realization and specificity of projects of functioning and development of fire fighting systems of the united territorial communities is justified. The analysis of the subject area was made and the need for the development of the scientific and methodical foundations of the systematic study of project management processes of the operation and development of fire extinguishing systems in the united territorial communities was justified.

The scientific and methodical principles of system research of processes of project management of functioning and development of fire fighting systems of united territorial communities are revealed. It is established that the above scientific and methodical principles are based on the use of methods of system approach, analysis and synthesis, analogies, induction and deduction, statistical generalization.

Projects of the operation of fire extinguishing systems of the combined territorial communities are considered as organizational and technological systems, and projects of their development as organizational and technical systems, which are interrelated between separate management processes. Each of these systems has three subsystems (control, project and product). These subsystems distinguish elements (input effects, parameters and results) that have their own specific characteristics.

The substantiated characteristics of elements of separate subsystems belonging to systems of projects of operation and development of fire extinguishing systems of the combined territorial communities reflect their characteristic components. They belong to two types of interconnected systems – organizational, technological, and organizational-technical. It is proved that the specified characteristics of the elements of individual subsystems change during their operation. These changes are due to the presence of causal links between the components of the fire-fighting systems of the united territorial communities. The disclosure of the causal relationships between the components of the fire fighting systems of the united territorial communities is one of the main tasks of managing the processes in the projects of the operation and development of the respective fire extinguishing systems.

It is established that the scientific and methodological principles of research of the indicated connections in two interconnected systems (organizational, technological, organizational and technical) have their own specificity both in relation to the project environment, and in relation to the configuration of projects and the resulting product.

Key words: project, management, operation, development, research, system approach, fire extinguishing system, united territorial communities.

INTRODUCTION

At present, the project management is penetrating more and more areas of human activity.

At the same time, it remains an important and effective means of development of various industries and territories. In Ukraine, the reform of the administrative-territorial system is being implemented.

The basic level of the new administrative-territorial structure of Ukraine remains the united territorial communities.

Each of the newly formed united territorial communities has a number of tasks, the solution of which requires the implementation of relevant projects.

One of the most urgent ones that provide security is the projects of the development of fire extinguishing systems of the united territorial communities.

Implementation of any projects, including projects for the development of fire extinguishing systems of united territorial communities, requires the implementation of a number of management processes and the development of scientific and methodological principles for their implementation.

Compared to other types of projects, these management processes are specific both to the design environment and to the configuration of the projects and the resulting product.

Appropriate scientific and methodological principles should be developed for the management of projects for the development of fire extinguishing systems of the united territorial communities.

The defining and very topical issue at present is the development of scientific and methodological principles of systematic study of the processes of project

management of the operation and development of fire extinguishing systems of the combined territorial communities.

THE ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Known methods and models of project management, programs and their portfolios related to the functioning and development of both organizations and certain sectors of the national economy are directed at solving a number of specific administrative tasks [1-17]. They are considered as relatively separate management processes, and in the system for the management of individual types of projects (operation or development). The existing tools for managing projects, programs and their portfolios are based on different methods and approaches. However, for the successful implementation of projects, programs and their development portfolios, organizations, industries and territories should have a database and knowledge that is formed only as a result of the implementation of projects, programs and their portfolios of their functioning. Therefore, for the effective implementation of projects, programs and their development portfolios, organizations, industries and territories should consider projects for their functioning and develop scientific and methodological principles based on a systematic approach to the investigation of relevant management processes [2, 9, 13].

The development of tools for managing projects, programs and their portfolios, based on a systematic approach, paid much attention both to domestic [2, 9], as well as to foreign scientists [18]. Based on their analysis, it can be concluded that for the management of projects, programs and their portfolios in various subject areas, the most effective tool is a systematic approach. It provides an opportunity to consider the system as a whole to study its whole and its individual elements at different times of operation. In addition, the systematic approach provides an opportunity to improve the quality of project, program and portfolio management in different subject areas, taking into account the interconnections between individual management processes.

Based on the analysis of current international standards [18-21], as well as methods and models for managing projects, programs and their portfolios for the development of fire extinguishing systems [3, 4, 6, 7], it can be argued that they systematically do not foresee the study of the processes of project management of the functioning and development of systems fire extinguishing of united territorial communities.

The scientific and methodological principles developed by us, which are based on the use of a system approach to project management of the operation and development of fire extinguishing systems of the united territorial communities, fully take into account their specificity as their design environment, and the configuration of projects and product obtained. The mentioned scientific and methodical principles underlie development of methods and models for management of projects of operation and development of fire fighting systems of united territorial communities, which will provide an increase in the quality of management of them by substantiating the correct management decisions.

OBJECTIVE

To reveal scientific and methodical principles of systematic study of processes of project management of functioning and development of fire extinguishing systems of united territorial communities.

THE MAIN RESULTS OF THE RESEARCH

To uncover the scientific and methodological principles of the study of the processes of project management of the operation ($Ï_{ô}$) and development ($Ï_{ð}$) of the fire extinguishing systems of the united territorial communities, we use methods of systematic approach, analysis and synthesis, analogies, induction and deduction, statistical aggregation (Fig.).

The development of fire extinguishing systems of joint territorial communities involves the implementation of a purposeful and logical change in the composition and structure of these systems. This makes it possible to increase the value ($Ö_c$) of these systems. In order to ensure the development of fire extinguishing systems of the united territorial communities, it is necessary to implement development projects $Ï_{ð}$ that are considered as organizational and technical systems (OT_nS). These projects are aimed at transferring the existing fire fighting systems of the combined territorial communities (S_n) to their desired state ($S_á$) .

With regard to the projects of the operation ($Ï_{ô}$) of the fire extinguishing systems of the united territorial communities, they are considered as organizational and technological systems (OT_iS). These projects belong to hybrid projects. Under hybrid projects are those projects that have a characteristic feature periodically repeated, which provides the formation of certain experience (knowledge) in their implementation [17]. The need for their implementation arises during operational and project activities. In our case, the operational activity refers to the activity of providing fire safety on the territory of separate united territorial communities. Such activities are planned and preventive. In the event of a fire on the territory of a united territorial community, fire extinguishing systems functioning ($Ï_{ô}$) with all attributes of the project activity (uniqueness, uniqueness, timeliness, limited resources, etc.) should be implemented. Consequently, the projects of the operation ($Ï_{ô}$) of the fire extinguishing systems of the united territorial communities are aimed at the elimination of individual fires that occur on their territory. They relate to the implementation of design work for the elimination of fires, which ensures the transfer of certain objects from the current state (fire) ($Ð_n$) to their desired state (eliminated fire) ($Ð_á$).

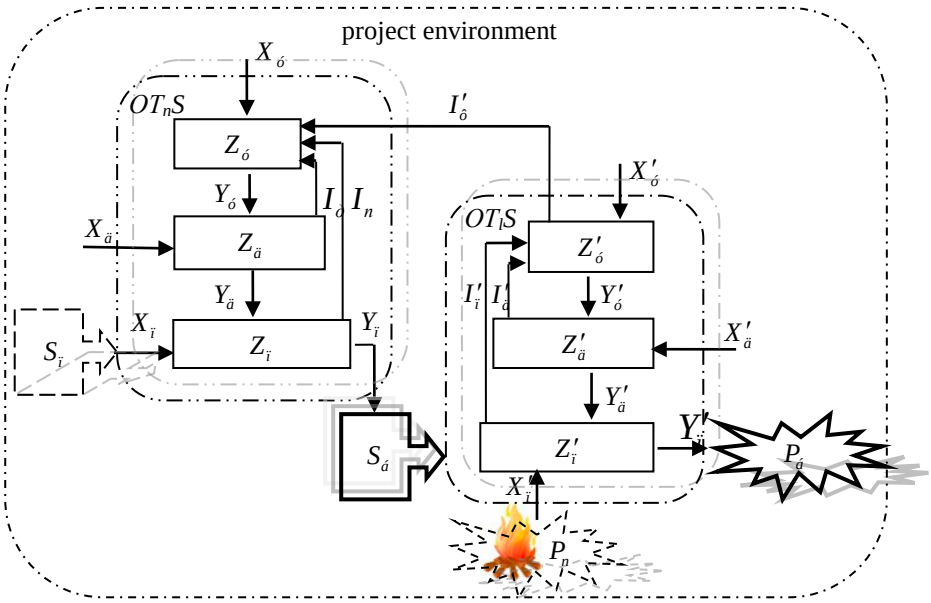

Fig. System interconnections between the projects of operation and development of fire fighting systems of the united territorial communities: OT_nS, OT_lS – accordingly organizational-technical (development) and organizational-technological (functioning) of the fire-extinguishing system; $X_ï$, $X_ä$, $X_ó$ – respectively, the inputs of the control subsystems, the design and product of the OT_nS; $X'_ï$, $X'_ä$, $X'_ó$ – respectively, the inputs of the control subsystems, the design and the OT_lS; $Z_ï$, $Z_ä$, $Z_ó$ – respectively, the parameters of the control subsystems, the project and the product of the system OT_nS; $Z'_ï$, $Z'_ä$, $Z'_ó$ – respectively, the parameters of the control subsystems, the project and product OT_lS; $Y_ï$, $Y_ä$, $Y_ó$ – respectively, the results of management subsystems (managerial decisions), project (actions) and product (transformation) of the OT_nS; $Y'_ï$, $Y'_ä$, $Y'_ó$ – respectively, the results of the subsystem management (management decisions), the project (actions) and product (transformation) OT_lS; , $S_ï$, $S_á$ – respectively, the existing and desired state of the OT_nS; $Ð_ï$, $Ð_á$ – respectively, the existing and desired state of OT_lS.

When considering projects and from a systematic approach, we can note that the corresponding OT_nS and OT_lS systems that describe them are artificial and temporarily created. They consist of characteristic elements, which are reflected by the corresponding characteristics (tab.).

Mentioned in tabl. the characteristics reflect the characteristic elements (constituents) of the corresponding subsystems belonging to two types of interconnected systems.

They change during their operation. These changes are due to the presence of causal relationships between the elements of the subsystems, the disclosure of which is one of the main tasks of project management and fire fighting systems of the combined territorial communities. Further researches require the development of scientific and methodological grounds for the study of the connections between the elements of the subsystems of two interrelated systems (OT_nS and OT_lS).

First of all, let's consider the system of OT_lS, which describes the implementation of projects $Ï_ô$ for the operation of fire fighting systems in the united territorial communities. This system is intended for the transfer of a separate object from the state P_n (fire) to the state (eliminated fire). At the same time, the characteristics of the fire on a separate object ($X'_ï$) are different and unique. There are at least two fires of the same characteristics in nature. Therefore, each fire is unique, and it notes the uniqueness of the project $Ï_ô$.

Characteristics ($X'_ï$) of a fire are: the type of object on which the fire occurred (γ); total area that can burn (S); potential combustion rate (*W*); the value of material assets that may be lost (*B*). These characteristics will be called the technological characteristics of combustion. In addition, the following characteristics of the combustion object are important characteristics of the fire-fighting objects: access to the fire along the perimeter of the object (P_g); distance from the combustion object to the location of the fire units (*L*), etc. [7].

Considering it, we can write a managerial ($Y'_ó$) operation that deals with the identification (O_{y1}) of the combustion object:

$$O_{y1}: Ф = (\gamma, W, S, B, P, L), \qquad (1)$$

where: Φ – physical characteristics of the object of combustion.

These characteristics belong to the parameters of the subsystem project of the operation of the fire fighting systems of the united territorial communities and determine the configuration ($K_ô$) of the projects of the operation of the fire extinguishing systems of the combined territorial communities, which for the most part changes during their life cycle.

Table. Components of organizational-technical (development) and organizational-technological (functioning) of fire extinguishing systems of the combined territorial communities

Subsystem	Element	Marks	Characteristics
Organizational-technical system (OT_nS) fire extinguishing of united territorial communities			
management	incoming influences	$X_{ó}$	plurality of characteristics of the project environment of development projects
		$I'_{ô}, I_{ä}, I_{ï}$	accordingly, information on the implementation of the projects of operation, implementation of actions and transformations of fire extinguishing systems
	parameters	$Z_{ó}$	configuration of the subsystem management of development projects
	results	$Y_{ó}$	management decisions on implementation of actions in development projects
project	incoming influences	$X_{ä}$	resources for development projects
	parameters	$Z_{ä}$	configuration of development projects
	results	$Y_{ä}$	a set of actions for the development of fire extinguishing systems of united territorial communities
product	incoming influences	$X_{ï}$	a set of characteristics of the existing fire extinguishing system
	parameters	$Z_{ï}$	product development design
	results	$Y_{ï}$	indicators of the value of the desired fire extinguishing system
Organizational-technological system (OT_lS) fire extinguishing of the combined territorial communities			
management	incoming influences	$X'_{ó}$	characteristics of the project environment of operation projects
		$I'_{ä}, I'_{ï}$	accordingly information on the implementation of actions and transformations in the projects of operation
	parameters	$Z'_{ó}$	Configuration of the operation management subsystem
	results	$Y'_{ó}$	management decisions on the implementation of actions in the projects of operation
project	incoming influences	$X'_{ä}$	resources for performance projects
	parameters	$Z'_{ä}$	configuration of operation projects
	results	$Y'_{ä}$	a set of actions in the projects of operation
product	incoming influences	$X'_{ï}$	fire characteristics on a separate object
	parameters	$Z'_{ï}$	project product configuration configuration
	results	$Y'_{ï}$	performance indicators

Typically, the configuration $K_{ô}$ is displayed by the design and technical parameters ($Z'_{ä}$). The change in the configuration $K_{ô}$ of firefighting operation projects $Ï_{ô}$ of united territorial communities during their life cycle is an important scientific and practical problem in managing these projects. It is solved mainly in two stages: 1) preparatory; 2) design and technological.

The preparatory stage for the projects $Ï_{ô}$ is special. He characterizes the readiness of fire and rescue units of voluntary fire protection for exits to extinguish fires. This readiness depends on the organization of the work of fire teams (the presence of a round-the-clock duty of the fire department at the depot, or the collection of members from the community, etc.). That is, the preparatory stage of the relevant projects is characterized by the willingness of the teams to leave for a fire. However, this readiness does not mean that any project $Ï_{ô}$ of the operation of fire fighting systems of the united territorial communities will start on time. The untimely receipt of information ($I'_{ï}$) about the occurrence of a fire on one or another object, as well as the time spent on moving the fire and rescue teams from their place of deployment (fire depots) to the object of combustion, are the main reasons for delaying the launch of the relevant projects. This, as is known, predetermines the state of a fire (the state of combustion of an object) prior to the implementation of design and technological works. It is precisely this state that determines the scope and timing of design and technological works (works on the extinguishing of fires).

Thus, the projects $Ï_{ô}$ of the operation of fire extinguishing systems of the combined territorial communities are special. Their origin is largely due to the time when objects are ignited, as well as the time spent on moving fire and rescue teams to combustion objects.

Therefore, before the implementation of projects $Ï_{ô}$, we have a state of fire of a particular object of combustion, which is characterized by the following physical indicators: 1) the perimeter of the fire; 2) its area; 3) volume of combustion; 4) the volume of burnout of material values. In addition, before the project starts $Ï_{ô}$,

there may be loss of people and animals in the facility and potential victims in the danger zone [7].

The identification of these components and their incorporation into the fire fighting projects $Ï_{ô}$ of the integrated territorial communities largely determines the success of the fire fighting. Therefore, the following operation (O_{y2}) in the management of projects $Ï_{ô}$ for the operation of fire extinguishing systems of united territorial communities is the identification of the state of fires (Θ) is an integral part of the process:

$$\hat{I}_{ó2}: \Theta \to \gamma, \quad (2)$$

$$\left(Pr, S_r, Q_r\right) \wedge G_n \in \gamma. \quad (3)$$

where: P_r, S_r, Q_r – respectively perimeter, area and volume of combustion cell of a single object; γ – object of combustion; G_n – potential victims of a fire.

Consequently, at the time of project $Ï_{ô}$ launch, the organizational and technological system (OT_lS) should have information (I'_i) on the state of the combustion object that needs to be transformed through the implementation of appropriate actions in the operation projects:

$$I'_i :\Leftrightarrow \left(^2_{\hat{O}} + ^2_{\Theta}\right). \quad (4)$$

where: $^2_{\hat{O}}, ^2_{\Theta}$ – respectively, information on the state of the object of combustion and fire that occurred in it.

Timely receiving of information I'_i is an important prerequisite for the success of projects $Ï_{ô}$ – minimizing losses from fires and correspondingly increasing the value of these projects. Without going into the analysis of the methods and system of obtaining this information, we note that the perspective direction is to obtain it mostly in automatic mode.

Based on the information I'_i received in the management subsystem with a given configuration ($\hat{E}_{ô}$), which includes project $Ï_{ô}$ managers (head of fire and rescue units, duty depots, etc.) and means for making managerial decisions (information and analytical systems, algorithms, methods, etc.), management decisions are made ($Y'_{ó}$) regarding the implementation of actions in the projects of the operation of the fire extinguishing systems of the united territorial communities. Based on managerial decisions, the design and technological parameters ($Z'_{ä}$) of the projects $Ï_{ô}$ of the operation of fire extinguishing systems of the combined territorial communities are substantiated. These parameters are based on the availability of resources ($X'_{ä}$) in the fire extinguishing system of the combined territorial communities. They include the material and technical base of fire depots and human resources (dispatchers, drivers, guardians, etc.). They largely affect the parameters of ($Z'_{ä}$) the subsystem, which represents the configuration ($\hat{E}_{ô}$) of the firefighting operation projects $Ï_{ô}$ of the combined territorial communities.

One of the main tasks of managing these projects $Ï_{ô}$ is to ensure successful implementation of the projects of the operation of the fire fighting systems of the united territorial communities. There is agreement on the content and time of the project (implementation of actions on the elimination of the fire) with available resources. Establishing this correspondence is carried out between the parameters (configuration $\hat{E}_{ô}$) $Z'_{ä}$ and the characteristics $X'_{ä}$ (resources $R_{ô}$) of the subsystem OT_lS.

At the same time, it is believed that the configuration $\hat{E}_{ô}$ depends on the characteristics X'_i of the fire on a separate object (Θ та $\hat{O}$), which are variables in time t, and from the resources $R_{ô}$ available in the fire and rescue subdivision, which are constant at the time of the fire:

$$\hat{E}_{ô} = f\left(\Theta, \hat{O}, R_{ô}\right), \quad (5)$$

where: $\hat{E}_{ô}$ – configuration of the project $Ï_{ô}$ of functioning of the fire extinguishing system of the united territorial communities; Θ, $\hat{O}$ – the characteristics of the fire and the combustion object respectively; $R_{ô}$ – resources for the elimination of the fire.

In order to coordinate in time the configuration $\hat{E}_{ô}$ of projects $Ï_{ô}$ with the characteristics Θ and $\hat{O}$ the object of combustion, it is necessary to distinguish between those characteristics that change in time. These include the characteristics of the state of combustion cells – Θ which are represented in the formula (2). The characterization of the state of combustion objects $\hat{O}$ – represented in formula (1) – is largely unchanged in time. In this case, it should be noted that in certain combustion objects, their characteristics $\hat{O}$ can also be changed in order to ensure the success of the implementation of the projects $Ï_{ô}$ of the operation of fire fighting systems of the combined territorial communities.

In addition, implementing fire extinguishing design projects $Ï_{ô}$ of joint territorial communities often encounter problems of localization of the fire in order to prevent its propagation to other objects. In other words, the design and technological parameters Z'_i represented by the configuration of the (K'_{ip}) product of the projects $Ï_{ô}$ of the operation of the fire fighting systems of the united territorial communities are determined not only by the characteristics of the state of the objects $\hat{O}$ and their combustion centers Θ, but also taking into account the presence of the neighboring objects and the distance to them from fire cell. It is precisely for them that there is a risk of fire from an existing fire. All of the above stipulates a management task that concerns not only the reconciliation of the configuration $\hat{E}_{ô}$ of the projects $Ï_{ô}$ of the fire-fighting systems of the combined territorial communities from the fire characteristics X'_i of the separate object (Θ та $\hat{O}$) and the available resources $R_{ô}$, but also the identification (identification) of the objects of the configuration of these projects for execution of additional works related to the protection of adjacent (neighboring) objects in relation to the object on which the fire occurred.

On the basis of the foregoing, concerning the organizational and technological systems of OT_lS, which concern the implementation of the projects $Ï_{ô}$ of the

operation of the fire fighting systems of the united territorial communities, one can distinguish the following set of actions $Y'_{ä}$ that concern: 1) the salvation of people, animals and material values; 2) extinguishing the fire cell, changing its condition; 3) changes in the state of the combustion object in order to improve the rescue and extinguishing processes; 4) protection against the ignition of adjacent (neighboring) objects [7].

The above functions are carried out through the implementation of appropriate actions (design and technical work), which are component projects $Ï_{p}$.

In order to carry out these actions, it is necessary to involve existing resources $R_{ô}$ (performers, technical means, material and technological, etc.).

In this case, there are managerial tasks concerning the justification: 1) the sequence of execution of design and technological works of different types; 2) provision of their human resources (executors); 3) provision of their technical means; 4) provision of their material and technological resources. As a result of solving the above tasks, appropriate management decisions are made and instructions are issued regarding their implementation.

Consequently, on the basis of the foregoing, we may note that during the implementation of the projects $Ï_{p}$ of the operation of the fire fighting systems of the united territorial communities, the processes of managing the configuration, content, time, and resources should be systematically implemented. Between them there are system interconnections, the effectiveness of which ensures obtaining the maximum value from the implementation of the projects $Ï_{p}$ of the operation of fire fighting systems of the combined territorial communities. In addition, there are specific causal relationships between the specified management processes in the projects $Ï_{p}$, which greatly influence the type and sequence of solving a plurality of managerial tasks.

Consider the system of OT_nS, which describes the implementation of projects $Ï_{p}$ for the development of fire extinguishing of the combined territorial communities. It is temporary and intended for the transfer of firefighting systems of the combined territorial communities from the existing state S_n to the desired state $S_{á}$. At the same time, the characteristics of the existing state of fire extinguishing systems of the united territorial communities (X_n) are constant. These include the characteristics of ($X_{ïî÷}$) fire and rescue units (FRUs), serving the separate united territorial communities; characteristics ($X_{ç}$) of the territorial zone of the combined territorial communities and objects of fire protection; damage (*З*) from fires:

$$X_n = f\left(X_{ïî÷}, X_{ç}, Ç\right). \quad (6)$$

Characteristics $X_{ïî÷}$ of the FRUs serving individual united territorial communities include the number ($ï_{ïî÷}$) of the PRH and their available resources ($R_{ïî÷}$) for the elimination of fires:

$$X_{ïî÷} :\Leftrightarrow \left(ï_{ïî÷}, R_{ïî÷}\right). \quad (7)$$

Resources $R_{ïî÷}$ available for FRUs for elimination of fires include human ($R_{ë}$), technical ($R_{ò}$) and material ($R_{ì}$):

$$R_{ïî÷} :\Leftrightarrow \left(R_{ë}, R_{ò}, R_{ì}\right). \quad (8)$$

Characteristics ($X_{ç}$) of the territorial zone of the united territorial communities and objects of fire protection include the number ($ï_{íñ}$) of population in separate settlements of the united territorial communities, the presence ($ï_{î}$) and characteristics ($\hat{O}$) of the objects in separate settlements of the united territorial communities, territorial location (Ψ) of individual settlements of the combined territorial communities relative to the FRUs:

$$X_{ç} :\Leftrightarrow \left(ï_{íñ}, ï_{î}, \hat{O}, \Psi\right). \quad (9)$$

The territorial location (Ψ) of settlements of the united territorial communities relative to the FRUs is characterized by distance (*L*) and state (ε) of the roads between them:

$$\Psi :\Leftrightarrow \left(L, \varepsilon\right). \quad (10)$$

At the same time, losses (*З*) from fires have two components of losses - material values ($З_м$) and loss of people ($З_л$):

$$Ç :\Leftrightarrow \left(Ç_{ì}, Ç_{ëç}\right). \quad (11)$$

Each of these components belongs to the configurations ($\hat{I}_{ê}$) of the development projects $Ï_{ð}$ of fire extinguishing of the combined territorial communities. With this in mind, we can write a managerial ($Y_{ó}$) operation that identifies the configuration objects ($\hat{I}_{ê}$) of the design environment $Ï_{ð}$ for the development of fire fighting systems in the united territorial communities:

$$\hat{I}'_{ó1} : \hat{I}_{ê} = \left(ï_{ïî÷}, R_{ïî÷}, ï_{íñ}, ï_{î}, \hat{O}, \Psi, Ç_{ì}, Ç_{ëç}\right). \quad (12)$$

The characteristics (12) specified in the expression determine the configuration ($K_n^{ð}$) of projects $Ï_{ð}$ for the development of fire extinguishing systems of the combined territorial communities. Typically, the configuration $K_n^{ð}$ is represented by a set of parameters ($Z_{ä}$) (configuration bases) that change throughout the life cycle of the specified projects. The justification of effective configuration databases is carried out in several stages, taking into account the changing configuration of the project environment.

The substantiation of effective project $Ï_{ð}$ configuration databases relates to the assessment of the existing state of the fire-fighting systems of the united territorial communities. This assessment is performed on the criterion of value, which is determined on the basis of relevant organizational and technological indicators - losses (*З*) from fires. At this stage, there are problems concerning the substantiation of the objectives (ξ) of the development projects of fire extinguishing of the combined territorial communities.

At the same time, the objective of the substantiation of the goals includes: 1) the analysis of the factors of the value of the fire-fighting systems of the combined territorial communities for their current state and the identification of the contradictions between them ($²_{ñó}$); 2)

the formation of a plurality of scenarios $\{\tilde{N}_{ö}\}$ for the transfer of firefighting systems of united territorial communities from the existing $S_{ï}$ to the desired state $S_{á}$; 3) defining among effective scenarios ($\tilde{N}^{å}_{ö}$) that provide maximum value; 4) development of a conceptual plan ($\hat{E}_{ï}$) of projects for the development of fire extinguishing systems of united territorial communities.

$$\hat{I}'_{ó2}:\xi=\left(^{2}_{ñó}\rightarrow\{\tilde{N}_{ö}\}\rightarrow\tilde{N}^{å}_{ö}\rightarrow\hat{E}_{ï}\right). \quad (14)$$

Consequently, the disclosure of a systematic approach to the study of project operation ($Ï_{ô}$) management processes and the development ($Ï_{p}$) of fire extinguishing systems of the combined territorial communities enabled the main components of the relevant systems to be identified, as well as identifying the main characteristics of the state of the requirements for their products that determine the configuration (parameters) of the relevant projects. The time-instability of the characteristics of the state of requirements (combustion centers) to extinguish fires is the reason of the time-instability of the firefighting project configuration, which is determined by the content, time and resources necessary for the implementation of design and technological works and fire and rescue functions in the projects of the operation ($Ï_{ô}$) of fire fighting systems of the combined territorial communities. Realization of projects of development ($Ï_{p}$) of fire extinguishing systems of joint territorial communities requires definition of their configuration according to the criterion of maximum value of their product (desirable fire extinguishing system of the combined territorial communities). The justification of the value of their product is based on the simulation of the projects of the operation ($Ï_{ô}$) of the fire extinguishing systems of the combined territorial communities, which allows to predict the relevant organizational and technological indicators and determine the values of value.

CONCLUSIONS

1. Based on the analysis of the state of the subject area, the necessity to implement the projects for the operation and development of fire fighting systems of the united territorial communities and the specifics of their project environment was substantiated.

2. The performed analysis of the toolkit for project management indicates the need to develop a scientific and methodological framework for a systematic study of project management processes for the operation and development of fire suppression systems of the united territorial communities.

3. The scientific and methodological foundations of the systematic study of the processes of project management of the operation and development of fire extinguishing systems of the united territorial communities are based on the use of methods of system approach, analysis and synthesis, analogies, induction and deduction, statistical aggregation.

4. On the basis of the conducted research the expediency of systematic consideration of the projects of operation and development of fire fighting systems of the united territorial communities as the appropriate organizational, technological and organizational-technical systems was substantiated.

5. It has been established that each of these systems has three subsystems (control, project and product) that contain their elements (input effects, parameters and results) that have their own specific characteristics.

6. Further researches require the development of scientific and methodological grounds for the study of the links between the elements of subsystems of two types of interrelated systems (organizational, technological, organizational and technical).

7. The indicated administrative tasks for the implementation of fire extinguishing projects made it possible to find out that their solution is possible by means of statistical simulation of relevant projects, which is based on knowledge in the subject field.

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СИСТЕМНЫЙ ПОДХОД К ИССЛЕДОВАНИЮ ПРОЕКТОВ ФУНКЦИОНИРОВАНИЯ И РАЗВИТИЯ СИСТЕМ ПОЖАРОТУШЕНИЯ ОБЪЕДИНЕННЫХ ТЕРРИТОРИАЛЬНЫХ ОБЩИН

Аннотация. Обоснована необходимость реализации и специфика проектов функционирования и развития систем пожаротушения объединенных территориальных общин. Выполнен анализ предметной области и обоснована необходимость разработки научно-методических основ системного исследования процессов управления проектами функционирования и развития систем пожаротушения объединенных территориальных общин.

Раскрыто научно-методические основы системного исследования процессов управления проектами функционирования и развития систем пожаротушения объединенных территориальных общин. Установлено, что указанные научно-методические основы базируются на использовании методов системного подхода, анализа и синтеза, аналогий, индукции и дедукции, статистического обобщения.

Проекты функционирования систем пожаротушения объединенных территориальных общин рассматривают как организационно-технологические системы, а проекты их развития как организационно-технические системы, которые взаимосвязаны между собой отдельными процессами управления. Каждая из указанных систем имеет по три подсистемы (управление, проект и продукт). В этих подсистемах выделяют элементы (входные воздействия, параметры и результаты), которые имеют свои специфические характеристики.

Обоснованные характеристики элементов отдельных подсистем, принадлежащих к системам проектов функционирования и развития систем пожаротушения объединенных территориальных общин, отражают их характерные составляющие. Они принадлежат к двум видам взаимосвязанных систем – организационно-технологических и организационно-технических.

Доказано, что указанные характеристики элементов отдельных подсистем меняются во время их функционирования. Эти изменения происходят благодаря наличию причинно-следственных связей между составляющими систем пожаротушения объединенных территориальных общин.

Раскрытие причинно-следственных связей между составляющими систем пожаротушения объединенных территориальных общин является одной из главных задач управления процессами в проектах функционирования и развития соответствующих систем пожаротушения.

Установлено, что научно-методические основы исследования указанных связей в двух взаимосвязанными системами (организационно-технологическими и организационно-техническими) имеют свою специфику как относительно проектной среды, так и по конфигурации проектов и полученного продукта.

Ключевые слова: проект, управление, функционирование, развитие, исследования, системный подход, система пожаротушения, объединенные территориальные общины.

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