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CONSTRUCTION ECONOMICS AND PECULIARITIES OF ADMINISTRATION OF PROJECTS FOR CONSTRUCTION OF CIVIL PROTECTION STRUCTURES

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Construction Economics and Peculiarities of Administration of Projects for Construction of Civil Protection Structures

Within the terms of the carried out study, it is found that the key aim of the system of administration of projects for construction of civil protection structures is to ensure a high level of coordination of the activities of all organizations involved in their development and implementation. This coordination should take into account the significant impact of such projects on strengthening national security and maintaining the economic stability of the State. It is found that modern approaches to the integration of various stakeholders, including government agencies, construction companies and design organizations, contribute to the creation of synergy in solving strategic objectives in this area. An analysis of the efficiency of the developed approach to project administration, which is based on the implementation of performance evaluation, quality control and agile management tools, is carried out. The role of the State system of technical regulation in the formation of a single regulatory framework that contributes to the harmonization of national construction standards with international requirements is also assessed. The expediency of using a multi-level system of criteria to evaluate the success of project implementation, which covers technical, economic, environmental and social aspects, is substantiated. A conceptual model of an efficient administration system has been developed, which combines the processes of strategic planning, resource management, monitoring of implementation and final evaluation of project results. It is proposed to introduce mechanisms for attracting funding from public, private and international sources, which ensures the sustainability and duration of project implementation. The proposed system of administration contributes to the maximum use of the economic and social potential of the construction of protection structures, ensuring compliance with national priorities of security and sustainable development. The results of the study create the basis for the formation of an innovative environment that contributes to increasing the competitiveness of the State, attracting investments and achieving long-term economic growth focused on strengthening the civil protection system.

Keywords: *construction, civil protection structures, project administration, scoring model, construction norms and standards, economic efficiency.*

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Петруха Н. М., Петруха С. В., Тюрменко Я. М., Кононенко І. М. Економіка будівництва та особливості адміністрування проєктів будівництва захисних споруд цивільного захисту

З межах проведеного дослідження встановлено, що ключовою метою системи адміністрування проєктів, спрямованих на будівництво захисних споруд цивільного захисту, є забезпечення високого рівня координації діяльності всіх організацій, залучених до їх розробки та реалізації. Ця координація повинна враховувати значний вплив таких проєктів на зміцнення національної безпеки та підтримку економічної стабільності держави. З'ясовано, що сучасні підходи до інтеграції різних зацікавлених сторін, включаючи державні органи, будівельні компанії та проєктні організації, які сприяють створенню синергії у вирішенні стратегічних завдань у цій галузі. Проаналізовано ефективність розробленого підходу до адміністрування проєктів, який базується на впровадженні інструментів оцінювання результативності, контролю якості та гнучкого управління. Також

було оцінено роль державної системи технічного регулювання у формуванні єдиної нормативно-правової бази, яка сприяє гармонізації національних будівельних стандартів із міжнародними вимогами. Обґрунтовано доцільність використання багаторівневої системи критеріїв для оцінки успішності реалізації проєктів, яка охоплює технічні, економічні, екологічні та соціальні аспекти. Розроблено концептуальну модель ефективної системи адміністрування, яка поєднує процеси стратегічного планування, управління ресурсами, моніторингу виконання та підсумкової оцінки результатів проєктів. Запропоновано впровадження механізмів залучення фінансування з державних, приватних і міжнародних джерел, що забезпечує стійкість і тривалість реалізації проєктів. Запропонована система адміністрування сприяє максимальному використанню економічного та соціального потенціалу будівництва захисних споруд, забезпечуючи відповідність національним пріоритетам безпеки та сталого розвитку. Результати дослідження створюють підґрунтя для формування інноваційного середовища, яке сприяє підвищенню конкурентоспроможності держави, залученню інвестицій та досягненню довгострокового економічного зростання, орієнтованого на зміцнення системи цивільного захисту.

Ключові слова: *будівництво, захисні споруди цивільного захисту, адміністрування проєктів, скорингова модель, будівельні норми та стандарти, економічна ефективність.*

Рис.: *3.* ***Табл.:*** *2.* ***Бібл.:*** *22.*

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Introduction. In the face of growing quantity of man-made, natural, or military threats, the issue of ensuring reliable civil protection is of key importance for the national security of Ukraine. The structures of civil protection are one of the most important elements of the security system, which ensures the preservation of life and health of the population in extreme situations. Also, their construction requires significant financial, material and organizational resources, which requires careful economic analysis and efficient management. The non-compliance of many existing structures with modern safety standards, limited State funding and the lack of innovative approaches to construction project management create numerous challenges in this area. In addition, Ukraine's integration into global markets and the need to adapt international standards requires the development of new approaches to the administration of construction projects aimed at increasing the efficiency of resource use and ensuring the proper quality of construction of civil protection structures.

Thus, the study of the economics of construction and the peculiarities of project administration in this area is relevant both in terms of ensuring an appropriate level of safety and improving managerial practices in construction. The analysis of financial and economic aspects, the introduction of modern project management technologies and the adaptation of international experience will allow creating an efficient system for the construction of protection structures that will meet the modern challenges and needs of society.

An analysis of scientific research in the field of construction economics and administration of construction projects in general and civil protection structures in particular demonstrates that scientists consider this range of issues through the prism of several key aspects: cost-efficiency, regulatory support, project management, and technical standards.

In the research works of B. Bohdanets [1], V. Nuzhnyi [2], the importance of the economic component of the construction of protection structures is emphasized, in particular, the substantiation of the financial feasibility of such projects and the analysis of the costs of their implementation. Particular attention is paid to the issues of the State financing and attracting private investment in civil protection projects, also to optimizing costs and efficiency in the use of resources, which are the main factors affecting the effectivity of such projects.

Aspects of regulatory and legal support are considered in the works of R. Akselrod [3] and M. Tymoshenko [4] that study the impact of legislation and technical standards on the processes of construction of protection structures. In particular, special attention is paid to the need to harmonize national standards with international requirements, which will improve the quality of protection structures and ensure their compliance with modern challenges.

The issue of project management in the field of construction is revealed in the research work of A. Shpakov [5], in which the emphasis is placed on the use of components and tools of project management. The mentioned study proves that the in-

troduction of such tools significantly increases the efficiency of planning, control and implementation of construction projects in general and the construction of civil protection structures in particular.

Technical aspects of the construction of protection structures are considered in the studies of S. Buravchenko [6] and H. Hetun [7], where innovative materials, the latest construction technologies and requirements for the quality of structures are analyzed. The scientists note that the introduction of innovations makes it possible to increase the resistance of protective structures to various influences and ensure their durability.

Thus, the review of the scientific literature demonstrates that the issue of the economics of construction and administration of civil protection structures projects is multifaceted and requires an integrated approach that comprises economic, legal, managerial, and technical components.

Despite a sufficient amount of scientific research on construction economics and project management, certain aspects of the administration of civil protection structures construction projects remain insufficiently studied. In particular, the issues of development of integrated management models that would take into account the specifics of projects of this category, as well as methods for assessing the efficiency of construction in terms of long-term economic and social returns, remain relevant.

Formulation of the aim of the article (objective setting). The aim of the article is to systematize and form a structural and logical model of administration and management of projects related to the construction of civil protection structures.

Research objectives are:

- to examine the fundamental components of coordination of activities in the field of project management for the construction of protection structures;
- to determine the optimal managerial and technical approaches to interaction between government agencies, construction companies, project organizations and other participants to ensure strategic coherence along with taking into account the impact of protection structures projects on national security;
- to develop a model for the administration of projects for the construction of protection structures based on the creation of an integrated approach to strategic planning, resource management, monitoring of implementation and final evaluation of results, taking into account the State regulatory framework.

Presentation of the main material and scientific results obtained. It should be specified that the construction of civil protection structures is becoming a critical task that requires an integrated approach to project planning, management and implementation. In this context, standards and norms that define technical, safety and quality requirements for such structures, as well as modern approaches to project management, allowing to ensure the efficiency of construction processes, play a significant role. Standards and norms regulating the construction of structures of civil protection create the basis for their compliance with modern requirements of safety, reliability and durability. The regulatory documents used, among which the Ukrainian State Construction Codes, ISO safety standards and recommendations of international organizations are of particular importance, detailing design requirements, materials, construction and operation technologies [8].

The task of the civil protection project administration system is to ensure effective coordination of organizations involved in the development and implementation of such projects, taking into account their impact on improving the national security and economic stability of the country. Thanks to the introduction of such a system, it is possible to achieve a harmonious combination of the goals of protecting the population and stimulating economic processes that contribute to strengthening both the State security and sustainable development. The initiation and successful implementation of protection structures projects requires an integrated approach, which includes the involvement of a wide range of stakeholders, including government agencies, construction companies, project organizations and financial institutions. The project administration system should ensure effective interaction between these participants, creating conditions for prompt decision-making and minimizing risks at each stage of construction works.

Within the terms of the current study, a new approach to project administration is considered, based on the implementation of performance assessment and quality control tools (Fig. 1). The proposed approach involves building an agile management system that takes into account the specifics of each project, including its technical requirements, budget constraints, and time frames. The integration of such tools can significantly increase the efficiency of the administration system, which demonstrates the innovativeness of the studied approaches and their practical significance [9]. It is important to note that the system of administration of civil protection projects can be integrated into the overall management system of the organization and be considered as part of the «project management system», which ensures the efficient implementation of strategic goals in the field of civil protection. This kind of system is designed to facilitate the selection of the most perspective and viable projects at the stage of decision-making on their inclusion in the project portfolio, ensuring compliance with national security and development priorities.

The State system of technical regulation of design activities in the construction of protection structures constitutes a set of norms, standards, procedures and mechanisms that are established by the State to ensure a high level of safety, quality and compliance of projects with modern standards of sustainable development [10]. The above specified system is aimed at unifying approaches to the planning, construction and operation of protective structures, which contributes to increasing the reliability and durability of facilities, as well as ensures harmonization with international requirements. Within the terms of the study, projects for the construction of protection structures are considered regardless of their industry affiliation, which made it possible to revise and order the success criteria for different levels of implementation [11]. As result, we have identified seventeen key success criteria, which are grouped into four levels, which allows us to more accurately assess the efficiency of projects depending on their goals, scale and conditions of implementation (Tab. 1).

The success criteria applied to civil protection construction projects are universal for all implemented projects in this area and cover a wide range of aspects that allow for a compre-

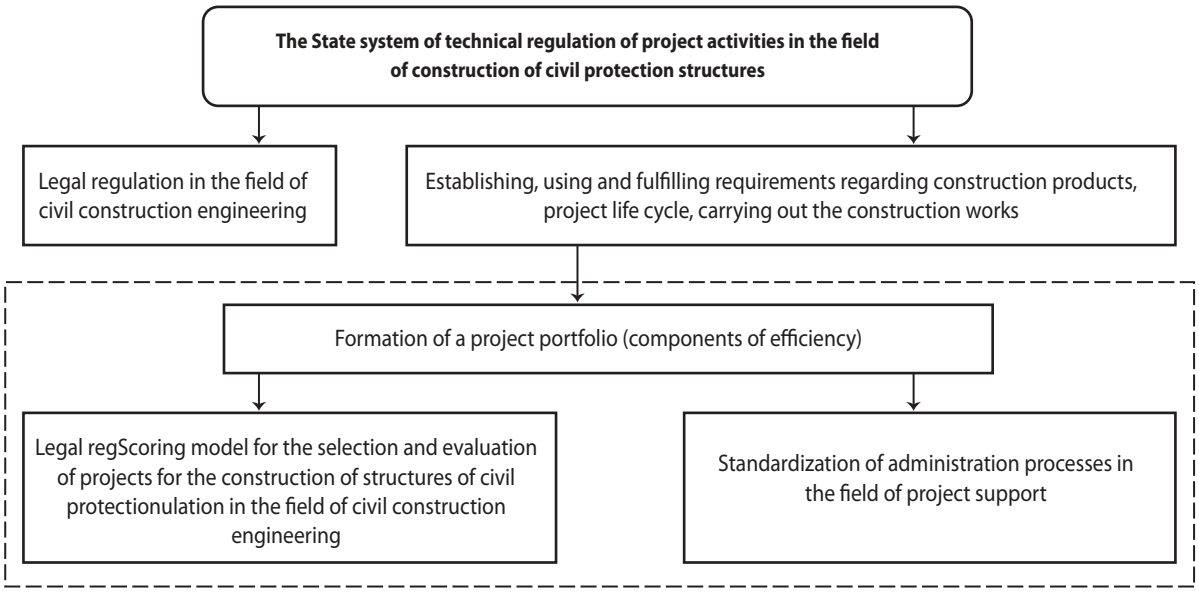

Fig. 1. Conceptual model of administration of projects for construction of civil protection structures

Source: developed by the authors

Table 1

Typologies of criterion levels of efficiency of initiation and implementation of projects for construction of civil protection structures

Criterion levels of efficiency	Evaluation indicators
Success in having a project management tool at command	▪ Application of project management methodology on a project/organization. ▪ Employing a project manager to fulfill project management. ▪ Availability of qualified project management specialists in the project/organization team
Implementation of a construction project	▪ Achieved goal of the construction project. ▪ Satisfaction of the orderer, sponsors and performers of the project. ▪ Consumer satisfaction with the project result
Effects for the construction business	▪ Positive indicators of the investment attractiveness of the project. ▪ Positive forecast of the economic efficiency of capital investments. ▪ Achievement of environmental, social and other categories of goals in the field of sustainable development. ▪ Achievement of the project's planned profitability indicators
Post-project potential	▪ Opens up new markets. ▪ Identifies new product derivatives. ▪ Creates new business opportunities. ▪ Improves processes in the construction organization and in the market. ▪ Increases reputation. ▪ Opens up new opportunities related to social assessment. ▪ Changes the self-esteem of the construction business

Source: improved by the authors on the basis of [12; 13]

hensive assessment of effectiveness and efficiency. The modern approach to the administration of such projects includes evaluation based on a multi-level system of criteria that reflect different interests related to achieving success [14].

The first level of criteria focuses on the project's compliance with established requirements and standards, compliance with construction deadlines, and efficient use of the budget. The second level of success is evaluated by the achievement of specific project goals, such as ensuring the reliability of protection structures, meeting the needs of the customer and a high level of quality of the work performed.

The third level is focused on the impact of the project on the organization's strategic goals, including financial profitability, improving competitive positions, and increasing customer loyalty. Finally, the fourth level covers the long-term impact of the project, and includes opening up new opportunities, developing innovative solutions, ensuring sustainable economic growth.

The legal aspects of project administration are an important component that provides a stable basis for the relevant implementation and regulation. The importance of studying the current state of development of the project management system in Ukraine lies in determining the readiness to implement new approaches and the need to improve existing regulatory mechanisms [15]. The specified process will contribute to the creation of an effective project management system that meets the requirements of the time and modern challenges in the field of civil protection (Tab. 2).

Table 2

Matrix for the development of project management in the field of construction of structures of civil protection, taking into account the interests of stakeholders

Stakeholder	The indicator of the development of the construction industry	Impact on the construction industry, creating new opportunities for development
Society	▪ Availability of current international and national standards in the field of project management	▪ Guarantee of obtaining high-quality construction products, services, projects of civil protection structures. ▪ Unification of methods and criteria for efficient project management, improving the quality of project work, reducing risks, and helping to improve results and achieve goals in various industries and organizations
Construction industry specialists	▪ The number of trained civil engineering professionals in the university field. ▪ The number of trained professionals in the professional environment. ▪ The number of certified project management professionals	▪ Availability of human resources. ▪ Experience and skills in the field of project management. ▪ Improving standards and qualifications in the field of project management
Construction organizations	▪ The level of development of professional associations and professional associations in the field of project management. ▪ The number of project-oriented construction companies in Ukraine	▪ Possibility of creating a technical committee for the management of projects of structures of civil protection
The State	▪ Application of project management in the public sector	▪ Possibility of integration of civil protection structures project management systems

Source: developed by the authors

The analysis of the indicators of development of construction industry is extremely important for the creation and effective implementation of a system for the administration of civil protection projects in Ukraine. Assessing external factors, such as economic, political, social and technological conditions, allows defining key risks that may affect the implementation of projects, as well as identifying opportunities that will contribute to the achievement of the goals.

The formation of a portfolio of projects in the construction of protection structures is a strategically important process, which involves a system approach to the selection of initiatives that most fully meet both the strategic priorities of the organization and the national tasks in the field of civil protection [16]. The project portfolio consists of a comprehensive set of projects that are as consistent as possible with the goals of security, efficient use of resources, and technical regulation.

Subjects of the administration system, including managers, experts, financial analysts and regulators, play a key role in the selection of projects for the portfolio. They analyze the market, assess the financial viability, level of risks and potential benefits from the implementation of each project, as well as check the compliance of projects with technical standards and quality norms [17].

Objects of the system, in particular the processes of project management and selection, provide the information and methodological basis that is necessary for the successful administration of the project portfolio. They contribute to the optimal allocation of resources, the control of implementation of tasks

and the achievement of goals. Thus, the formation of a project portfolio becomes an important tool for strategic development, which allows the organization to effectively allocate resources, ensure control and monitoring of project implementation, as well as achieve their compliance with the requirements of technical regulation when a certain process integrates subjects and objects of management, ensuring the overall efficiency of construction project administration (Fig. 2) [18].

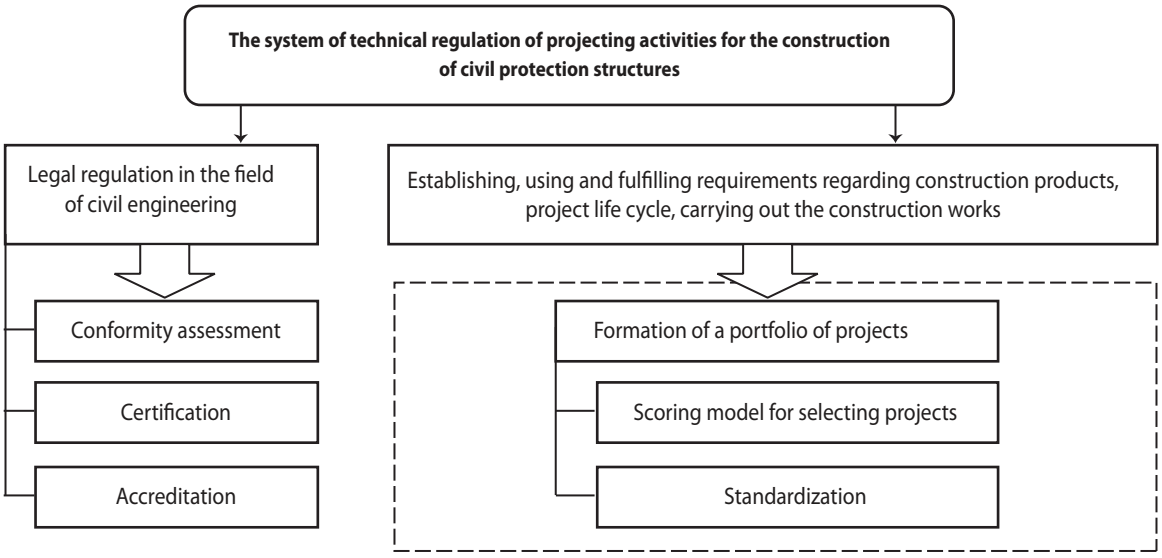

Fig. 2. Tools for technical administration of project activities in the field of construction of civil protection structures

Source: developed by the authors

The administration of the portfolio of projects aimed at the construction of civil protection structures involves a systematic approach to the management of strategically interrelated elements, such as individual projects, programs, portfolios and other related tasks, taking into account the complexity of the internal and external environment of the organization. The leading aspect of this process is investment in portfolio components that contribute to the development of the infrastructure of protective structures and correspond to the long-term strategy of the organization aimed at improving the level of security of the population. Furthermore, administration involves optimizing the available resources and capabilities of the organization to ensure maximum efficiency in their use. One of the key tasks is to increase the benefits of investments by implementing projects that can have a large-scale impact on the resilience and reliability of civil protection infrastructure [19; 20]. For this purpose, it is important to ensure that the expectations of all stakeholders are stated precisely, as well as that these expectations are efficiently managed in order to achieve mutual understanding between all participants in the process.

The fundamental role belongs to constant monitoring of the state and status of the portfolio components, taking into account the current national project management standards, which allows to ensure the consistency of work with the accepted requirements, to promote the timely implementation of tasks and maintain the proper level of quality of project implementation aimed at strengthening the civil protection system (Fig. 3).

Fig. 3 conventionally presents the structure of the system of technical regulation of design activities in the field of construction of structures of civil protection, which is built on the basis of a modern management approach. The proposed system integrates the components of management effectiveness aimed at achieving sustainable development goals, such as increasing economic sustainability, social security and infrastructural reliability, which are essential for the overall performance of the entire system.

When creating a project administration system, an organization develops a set of documents that regulate all aspects of project management. Such documents of internal origin include project management regulations and rules of procedure, project management manuals, as well as documentation describing management processes and procedures [21]. Such documents determine the internal organization of managerial processes and serve as a basis for their standardization.

Additionally, documents of external origin are used, which include technical regulations, international and national standards, construction norms and standards (e. G., DSTU), as well as other regulatory acts. The joint and harmonious use of internal and external documents ensures compliance with a high level of quality of project implementation, corresponding to the first level of success – efficient project management [22]. The introduction of a scoring system for evaluating projects within the framework of technical regulation allows to significantly increase the efficiency of resource allocation, focusing funds on the implementation of the most promising and significant initiatives. This approach helps to reduce the risks of inefficient use of financing, while increasing the chances of creating valuable infrastructure and services, which ultimately ensures economic growth and increased productivity on a national scale.

The aim of the State system of administration of civil protection projects should be creation of an efficient mechanism for regulating this constantly evolving industry by in-

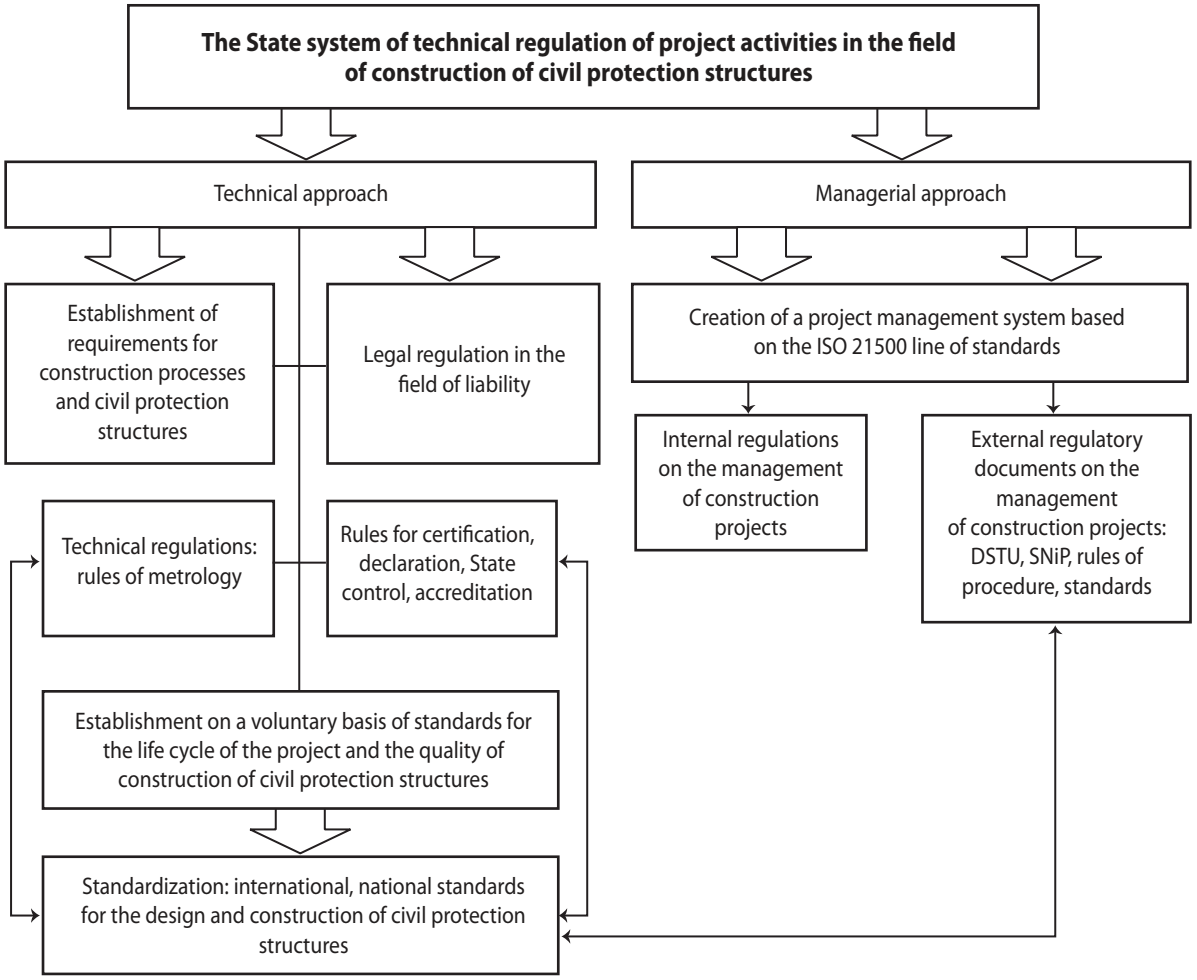

Fig. 3. Structural scheme of the organized system of technical regulation in the field of construction of civil protection structures

Source: developed by the authors

troducing tools that ensure the selection and implementation of only those projects that meet national priorities and contribute to strengthening the security and development of the State. The main objects of this system are project selection processes, among which the use of modern tools such as the scoring evaluation model, as well as the processes of managing the implementation of selected initiatives, play an important role. The interaction between the aim of the system, the objects of its regulation and key participants ensures the strategic coordination of activities in the field of construction of protection structures with national goals and objectives.

The subjects of the system are State institutions, organizations, enterprises, as well as other participants involved in the management and implementation of projects in the field of civil protection. An important element of the efficiency of this system is the organization of project selection processes based on the latest management approaches, which take into account the strategic guidelines of the country's development and ensure the targeted orientation of initiatives.

The introduction of a system of technical regulation with an emphasis on the use of scoring methods for evaluating projects opens up significant opportunities for the development of the national economy. This approach contributes to the optimal use of resources, risk reduction and support for innovative development through the introduction of modern technologies, advanced training of specialists and strengthening the competitiveness of the country. The specified system becomes a center for the formation of a favorable economic environment that attracts investors, expands opportunities for integration into global markets and stimulates sustainable development aimed at improving the well-being of the population. As a result, such a system becomes not only a tool for efficient project management, but also a mechanism that contributes to the economic prosperity and social stability of the Ukrainian State.

Conclusions. In the course of the study, it was found that the main task of the system of administration of projects aimed at the construction of civil protection structures is to create conditions for effective coordination of the activities of all organizations involved in the processes of development and implementation of such projects. This allows taking into account the significant impact of projects on strengthening national security, ensuring economic stability and achieving the strategic goals of the country's sustainable development. The leading methods of project management in the field of construction of protection structures, which are based on the integration of innovative tools and scoring systems for assess-

ing efficiency, have been studied. The use of these approaches contributes to a significant improvement in planning accuracy, increase in the quality of construction works, and ensures efficient risk management at all stages of project implementation.

The importance of the State system of technical regulation, which ensures the creation of a single regulatory framework that meets both national and international standards, is highlighted. This helps to increase the reliability and durability of structures, as well as taking into account environmental requirements. The need to use a multi-level system of criteria, allowing to assess the success of projects by technical, economic, social and environmental parameters, is substantiated. A conceptual model of an efficient administration system has been developed, which integrates the processes of strategic planning, resource management, monitoring of implementation and final evaluation of results. In addition, mechanisms for attracting financing from various sources, including public, private and international investments, are proposed, allowing to ensure the sustainability of projects and achieve a long-term economic effect from their implementation.

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