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ESSENCE, PRACTICAL MODELS, AND IMPLEMENTATION FEATURES OF PUBLIC-PRIVATE PARTNERSHIP IN THE CIVIL PROTECTION SYSTEM AT THE LOCAL COMMUNITY LEVEL

СУТНІСТЬ, ПРАКТИЧНІ МОДЕЛІ ТА ОСОБЛИВОСТІ РЕАЛІЗАЦІЇ ПУБЛІЧНО-ПРИВАТНОГО ПАРТНЕРСТВА В СИСТЕМІ ЦИВІЛЬНОГО ЗАХИСТУ НА РІВНІ МІСЦЕВИХ ГРОМАД

The article explores public-private partnership models in the civil protection sector of Ukrainian communities. The local budget deficit reduces the efficiency of security financing, making the attraction of private capital critically necessary. The study analyzes the impact of recent legislative initiatives on simplifying investments through digitalization. It highlights approaches to risk management and the implementation of the «PIERS» methodology, focusing on frontline regions. A financing model for dual-purpose facilities is proposed, integrating state systems such as «Prozorro.Sale», «DREAM», and «EDESSB» (Unified state electronic system in the construction sector). Applying these approaches transforms shelters into spaces for commercial use, while cross-subsidization relieves the financial burden on local budgets. The research results form the basis for strategies to rebuild protective infrastructure, ensuring community resilience.

Keywords: *public-private partnership, civil protection, dual-purpose shelters, local finances, PIERS methodology, martial law, infrastructure reconstruction, Prozorro.Sale, DREAM.*

У статті досліджено сутність, правові особливості та практичні моделі реалізації проєктів публічно-приватного партнерства у сфері цивільного захисту на рівні територіальних громад України в умовах воєнного стану. Доведено зниження ефективності традиційних механізмів фінансування інфраструктури безпеки через критичний дефіцит місцевих бюджетів. Ця ситуація робить критично необхідним залучення приватного капіталу. Проаналізовано вплив новітніх законодавчих ініціатив, зокрема проєкту Закону України «Про внесення змін до деяких законодавчих актів України щодо вдосконалення механізму залучення приватних інвестицій з використанням механізму державно-приватного партнерства для пришвидшення відновлення зруйнованих війною об'єктів та будівництва нових об'єктів, пов'язаних з післявоєнною перебудовою економіки України» від 15 липня 2022 року № 7508. Доведено здатність цього закону сприяти спрощенню процедур інвестування та подоланню бюрократичних бар'єрів завдяки цифровізації. Аналіз фахових джерел дозволив виокреми-

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ти підходи до управління ризиками та імплементації міжнародної методології оцінки інфраструктурних проєктів «PIERS» від Європейської економічної комісії ООН. Окрему увагу приділено специфіці реалізації безпекових ініціатив у найбільш вразливих прифронтових регіонах. Запропоновано розширену покрокову модель залучення приватного капіталу в будівництво об'єктів подвійного призначення з інтеграцією державних електронних систем Прозорро.Продажі, екосистеми «DREAM» та «ЄДЕССБ». Також наголошено на здатності таких інноваційних підходів трансформувати стандартні укриття на високотехнологічні підземні простори з можливістю їх комерційної експлуатації у безпечний час. Доведено соціальну важливість механізмів перехресного субсидування для ефективного зняття непомірного фінансового навантаження з місцевої скарбниці. Результати дослідження формують науково-практичне підґрунтя для розробки місцевих стратегій інвестування у відбудову захисної інфраструктури задля забезпечення стійкості територіальних громад.

Ключові слова: *публічно-приватне партнерство, цивільний захист, укриття подвійного призначення, місцеві фінанси, методологія PIERS, воєнний стан, відбудова інфраструктури, Прозорро.Продажі, DREAM.*

Formulation of the problem. Ensuring reliable civil protection of the population under prolonged martial law has transformed from a basic regulatory function of the state into a highly complex, multi-tiered challenge. The widespread destruction of critical and social infrastructure, the persistent threat of missile and drone strikes, and the obsolescence of Soviet-era protective shelters pose severe challenges for Ukrainian cities. At the level of territorial communities, which bear the primary burden of maintaining uninterrupted vital services and public safety, there is a substantial gap between the urgent funding needs for modern civil protection facilities and the actual capacities of war-depleted local budgets. Constructing state-of-the-art dual-use shelters, underground educational spaces, and fortified medical facilities demands substantial capital investment. In this context, the institutionalization of public-private partnerships emerges as an expedient model for cooperation between local self-government bodies and private business.

Analysis of recent research and publications. The study of this critical issue rests on a solid domestic and foreign scholarly foundation. The principles of state support in such projects are elaborated in the works of I. Zapatrina [1], who substantiates the mechanisms for adapting contracts to the UN Sustainable Development Goals and proposes a classification of risk allocation models between the state and business. This macroeconomic approach is effectively complemented by the research of V. Vakulenko, M. Sargiacomo, and V. Klymenko [2], who rigorously examine the transition of Ukraine's local budgets to an enforced operational survival mode under conditions of absolute uncertainty. Methodologically, this state of affairs accounts for the incapacity of local communities to independently fund large-scale capital construction. For their part, O. Lutsevych and D. Barbieri [3] propose a whole-of-society model for Ukraine's recovery. From their study, the imperative of engaging non-state actors in security infrastructure development is adopted, justifying the blurring of boundaries between public responsibilities and private initiative. This thesis aligns with the findings of B. Kosovych [4], who thoroughly explores the institutional and bureaucratic barriers to partnership at the local level. His findings enable the systematization of key obstacles preventing local councils from initiating the construction of complex civil protection facilities. The issue of national resilience as a baseline state strategy is comprehensively addressed by N. Khoma [5], whose scholarly output provides resilience indicators for assessing the efficiency of dual-use facilities as centers for preserving human capital. Concurrently, A. Vasina, A. Melnyk, and co-authors [6] perform mathematical modeling of martial law's impact on the rapid degradation of regional infrastructure, their work supplies the algorithms for calculating infrastructure losses and the cost of inaction for territorial communities. The economic impact of such investment projects is extensively described by O. Suntsova [7], who substantiates through calculations the positive multiplier effect of attracting private assets, demonstrating the capacity of these facilities to generate new tax revenues and stimulate local business. The spatial and technological evolution of

cities is investigated by V. Kruglov, J. Dvorak, and colleagues [8], who substantiate the necessity of smart recovery; requirements for the deep digitalization of shelter life-support systems are drawn from their smart development framework. A practical toolkit for evaluating such innovative solutions is adapted from the study by I. Krylova and H. Hlushchenko [9], providing performance indicators for current concession agreements. In analyzing post-war reconstruction processes, V. Sychova and T. Samofalova [10] emphasize the priority of attracting private capital, and their conclusions inform specific recommendations for eliminating practical legal hurdles at the land-site preparation stage. Financial and legal mechanisms for safeguarding citizen's rights to security through local programs are detailed by R. Bedrii and co-authors [11]. The international dimension of the issue is examined by A. Kouskoura and colleagues [12], who establish civil protection as one of the ten key drivers of sustainable regional competitivenessm this metric is integrated into the logical-structural model proposed in this study for evaluating community attractiveness to prospective investors. Despite this robust theoretical foundation, most contemporary research addresses public-private interaction solely through the lens of conventional economic infrastructure, concentrating on road and bridge construction. Conversely, the implementation of financial mechanisms directly within the civil protection system remains insufficiently explored. This scholarly gap leads to an inadequate understanding of how recent legislative amendments impact the structuring of dual-use security projects. Consequently, there is an acute need to resolve the practical challenge of aligning international investment requirements with the specific demands of constructing underground schools in high-risk zones through the integration of modern state electronic ecosystems.

Purpose of the article is to comprehensively investigate the practical mechanisms for implementing public-private partnerships within the civil protection system at the local community level, as well as to develop an original step-by-step model for designing dual-use facilities through the application of international methodology and national digital tools.

Presentation of the main material. An analysis of the practical experience in implementing security projects demonstrates a fundamental transformation in the role of business: the private partner ceases to be a mere contractor fulfilling a public order and evolves into a full-fledged co-creator of social value, capable of simultaneously protecting human lives and ensuring its own financial sustainability. For a long time, the applicable provisions of the Code of Civil Protection of Ukraine (№ 5403-VI of October 2, 2012 [13]) rendered the construction of shelters exclusively an expenditure burden for the state, substantially impeding the expansion of the civil defense shelter stock. It was precisely the inability to independently cover these financial commitments due to acute local budget deficits that compelled authorities to seek novel capital-attraction tools, thereby driving the modernization of the Law of Ukraine «On Public-Private Partnership» (№ 2404-VI of July 1, 2010 [14]) and the Law of Ukraine «On Concession» (№ 155-IX of October 3, 2019 [15]). A logical continuation of these reforms was the drafting of the governmental draft Law of Ukraine «On Amendments to Certain Legislative Acts of Ukraine Concerning the Improvement of the Mechanism for Attracting Private Investments Using the Public-Private Partnership Mechanism to Accelerate the Restoration of War-Damaged Facilities and the Construction of New Facilities Related to the Post-War Restructuring of the Economy of Ukraine» № 7508 of July 15, 2022 [16]. The adoption of this act makes it possible to dramatically expedite documentation preparation, replacing years of administrative delay with a streamlined process spanning only several months. At the same time, the primary investment advantage of the new regulations lies in expanding the scope for allocating property rights to newly created assets, granting developers the legal right to utilize the constructed premises during peaceful periods.

To formulate a sound perspective on integrating these statutory provisions into territorial governance practice, it is necessary to examine the scholarly contributions of domestic and

foreign experts to trace the relationship between theoretical concepts and applied tools (see Table 1).

An analysis of the presented concepts (Table 1) reveals a profound contradiction at the current stage within the public administration system. The concept of national resilience

Table 1

Key scholarly insights of domestic and foreign experts on financing and developing safe community infrastructure

№	Author	Contribution to addressing the issue	Practical value for territorial communities
1	Khoma N. (2024)	Conceptualization of national resilience, transforming shelters from passive concrete basements into active centers for the continuous preservation of human capital during prolonged conflicts	Allows municipalities to justify the high social significance of projects to international grant funds, framing them as a critical tool for preserving the working-age population and youth
2	Vasina A. et al. (2024)	Creation of complex mathematical algorithms to calculate the impact of martial law on the rapid degradation of regional infrastructure and associated economic losses	Provides local economic departments with precise formulas to calculate the direct and indirect damages caused by community inaction in the event of a complete business halt during air raid alerts
3	Zapatrina I. (2018)	Elucidation of financial mechanisms for risk distribution and the provision of state support to investors in the context of achieving the global Sustainable Development Goals	Provides a toolkit for calculating municipal guarantees for private developers who agree to invest in security facilities with long-term deferred profitability
4	Kruhlov V. et al. (2024)	Development of the theory of smart urban revitalization through the deep integration of innovative technologies for resource consumption management	Substantiates the technical requirement to design state-of-the-art smart shelters with automated ventilation systems, the Internet of Things (IoT), and climate control, rather than conventional underground premises
5	Vakulenko V. et al. (2025)	Description of the behavioral patterns of local authorities, who are forced to transition from capital investments to operational survival due to the cessation of long-term planning	Confirms the objective inability of city councils to independently finance large-scale construction projects, rendering the attraction of external investors the only viable path
6	Suntsova O. (2024)	Econometric proof of the positive multiplier effect of joint public-private assets on the expansion of the local economic base	Provides compelling arguments for local deputies regarding the capacity of dual-use facilities to generate new jobs and stimulate the local market for building materials
7	Lutsevych O. (2026)	Proposal of an inclusive society paradigm, which envisions the joint (solidary) responsibility of all actors for the comprehensive post-war recovery of the regions	Legitimizes the complete erasure of artificial boundaries between state security obligations and private commercial initiatives within a single building
8	Sychova V. (2023)	Analysis of applied legal obstacles and legislative gaps regarding the implementation of post-war concession agreements at the local level	Provides a detailed list of typical bureaucratic errors to help authorities avoid them during the critical stage of preparing land plots for transfer to an investor

Source: developed by the author based on [1, 2, 3, 5, 6, 7, 8, 10]

developed by N. Khoma [5] forms a solid foundation, establishing an exceptionally high standard of quality for modern facilities. This theoretical approach is complemented by V. Kruhlov's theory of smart revitalization [8]. The latter requires local communities to build technologically advanced and resilient infrastructure utilizing digital smart systems. The criteria set by these researchers necessitate the transformation of standard shelters into multifunctional innovation centers capable of operating in complete autonomy for months, fully sustaining the livelihoods of hundreds of people. However, these ambitious engineering requirements inevitably clash with a harsh financial reality, which is detailed in the works of other scholars. V. Vakulenko's research on the survival of local budgets [2] and A. Vasina's mathematical modeling of losses [6] demonstrate a significant decline in the government's ability to independently finance such initiatives amid plummeting tax revenues. Evaluating the practical value of each study presented in the table above helps outline ways to overcome these financial barriers. The tools for eliminating legal obstacles described by V. Sychova [10] and the legitimization of non-state actor's participation highlighted by O. Lutsevych [3] point to the necessity for profound organizational changes in the operations of local councils. The public-private partnership (PPP) mechanism serves as an optimal solution capable of reconciling the highest technological demands with the actual financial capacities of the regions. I. Zapatrina's analysis of state guarantees [1] and O. Suntsova's study on the impact of assets [7] validate a role distribution wherein the state assumes complex regulatory functions, while the commercial sector covers the lion's share of capital expenditures. In exchange for multimillion-dollar investments in the security infrastructure, the private partner secures the legal right to commercially operate the facility during periods without security threats. Consequently, municipalities obtain fully equipped smart shelters with a minimal initial financial burden. The specific challenges of implementing security projects are particularly acute in frontline regions, where missile approach times are reduced to mere seconds. This geographical factor renders the evacuation of civilians to remote shelters ineffective, necessitating the creation of autonomous underground spaces in immediate proximity to educational institutions or hospitals. As state subventions are rapidly depleting, it is increasingly urgent for cities to transition toward the extensive attraction of private capital. To ensure the capability to attract international grants, municipalities must implement the global evaluation methodology known as PIERS, developed by the United Nations Economic Commission for Europe (UNECE) [17].

Next, we will detail the six criteria of the «PIERS» methodology and their correlation with the works of domestic and international experts (see Table 2).

An analysis of the adapted «PIERS» criteria (Table 2) reveals a shift in the priorities of investment attractiveness within the sphere of strategic public construction. While the fundamental indicator of success was previously the developer's financial profit, the facility's capacity to generate comprehensive benefits for the community now takes precedence [17]. Each of the six elements of the international methodology is corroborated by the works of Ukrainian scholars, transforming theoretical frameworks into measurable indicators. The requirement to ensure accessibility and social equity, substantiated by O. Lutsevych's research [3], obliges the investor to anticipate additional costs for elevators and ramps, as well as the installation of tactile paving, specialized sanitary zones, and safe spaces for people with limited mobility. Fulfilling this condition helps secure concessional grant co-financing from European funds, thereby improving the project's financial metrics. The criterion of environmental sustainability and environmental protection, scientifically grounded in the works of I. Zapatrina [1], aims to reduce emissions during construction through the use of eco-friendly materials and the application of zero-waste technologies for recycling construction debris. This approach is coupled with the criterion of resilience and disaster risk reduction, developed based on the conclusions of N. Khoma [5]. The installation of solar panels, modern submersible pumps, heat pumps, and backup generators to ensure the absolute engineering autonomy of the underground facility is no longer viewed merely as

Table 2

Practical application of international standards for the construction of reliable shelters

№	PIERS methodology element	Practical implementation in a community security project	Scientific framework and corresponding authors
1	Ensuring accessibility and social equity	One hundred percent inclusiveness of the shelter, featuring gently sloping ramps, tactile paving, specialized sanitary zones, and gender-sensitive spaces for people with limited mobility	Based on the inclusive society and equal rights paradigm developed by Lutsevych O. [3]
2	Economic feasibility and fiscal sustainability	Reducing the burden on the budget through a cross-subsidization mechanism, where operational costs are covered by business revenues from paid parking during peacetime	Relies on the macroeconomic models of the efficiency of joint assets and their impact on the community, authored by Suntsova O. [7]
3	Environmental sustainability and environmental protection	Minimization of the construction's carbon footprint through the use of eco-friendly materials and the application of circular economy technologies in the recycling of construction debris	Reflects the concept of sustainable infrastructure development and the implementation of green technologies, substantiated by Zapatrina I. [1]
4	Resilience and disaster risk reduction	Ensuring the absolute engineering autonomy of the underground facility utilizing its own solar panels, heat pumps, backup generators, and artesian wells	Reflects the indicators of national resilience developed by Khoma N. [5], which require the facility to be capable of withstanding blackouts
5	Replicability and scalability	Creation of a set of standardized modular architectural solutions to enable the rapid replication of the successful project in other frontline cities with varying soil types	Corresponds to the methodology of the technological revitalization of Ukrainian cities and the implementation of smart solutions by Kruhlov V. [8]
6	Public and stakeholder engagement	Holding fully open hearings involving emergency responders, educators, and parent committee representatives specifically at the stage of creating the initial architectural draft	Supported by R. Bedrii's research [11] on the necessity of institutional protection of citizens' constitutional rights

Source: developed by the author based on [1, 3, 5, 7, 8, 11]

an added advantage. These technologies become a critical element for the physical survival of people in a confined space during prolonged power outages or damage to the main water supply. The requirement for replicability and scalability, supported by V. Kruhlovl's concept [8], incentivizes leading architectural firms to develop sets of standardized modular solutions. Consequently, it becomes possible to rapidly replicate successful projects in other frontline cities with different soil types without significant expenses for redesigning and geological surveys. The indicator of economic feasibility and fiscal sustainability, calculated using O. Suntsova's mathematical models [7], entails reducing the burden on the local budget through a cross-subsidization mechanism, where operational costs are covered by business revenues from paid parking during peacetime. Combining this economic instrument with the criterion of public and stakeholder engagement, developed in R. Bedrii's legal research [11], builds a strong social foundation of trust by holding fully open hearings involving emergency responders, educators, and parent committee representatives specifically at the stage of creating the initial architectural draft. Such an approach guarantees the development

of infrastructure projects that account for the real environmental and security needs of the residents in a specific neighborhood. The practical fulfillment of all six interconnected requirements is the primary condition for a city to successfully pass due diligence by major institutional investors.

To effectively manage these processes at the local government level, a detailed step-by-step model has been developed. This algorithm breaks down the complex path of attracting private capital into six sequential stages with specific steps (see Table 3).

A review of the developed step-by-step model (Table 3) indicates the presence of a well-thought-out algorithm for protecting the interests of all parties involved in

Table 3

Model for the step-by-step attraction of private capital into the construction of dual-use facilities

№	Implementation steps	Actions of the parties to the process (authorities and business)	Legal and scientific framework	Practical outcome and risk mitigation strategies
1	2	3	4	5
Stage 1. Needs analysis and concept preparation				
1	K.1.1 Audit of the existing stock of protective structures	The authorities record the deficit of spaces in shelters and allocate land. Business evaluates the commercial attractiveness of the location and the preliminary cost estimate	Law of Ukraine «On Local Self-Government in Ukraine», research on budget constraints by V. Vakulenko [2]	A clear public request is formulated. The risk of a lack of demand is mitigated through open dialogue with community residents
2	K.1.2 Land allocation			
3	K.1.3 Development of a feasibility study			
Stage 2. Transparent investment competition				
4	K.2.1 Publication of conditions on the Prozorro.Sale platform	The city council announces an electronic auction or competition on the state platform Prozorro.Sale. Investors compete for the right to build	Draft Law № 7508 on the simplification of procedures, research on eliminating corruption barriers by B. Kosovych [4]	A reliable private partner is selected. Corruption risks are eliminated thanks to the automated electronic bidding system
5	K.2.2 Evaluation of submitted financial models			
6	K.2.3 Conclusion of a partnership agreement			
Stage 3. International expertise and scoring				
7	K.3.1 Evaluation according to PIERS criteria	Auditors assess the project for compliance with sustainable development goals and enter it into the digital ecosystem for reconstruction management DREAM	Requirements of DBN V.2.2-5-2023, works on corporate social responsibility by O. Lutsevych [3]	The project receives confirmation of reliability from donors. The risk of constructing a substandard facility is neutralized by data openness
8	K.3.2 Project registration in the DREAM ecosystem			
9	K.3.3 Attraction of grant co-financing			
Stage 4. Engineering design				
10	K.4.1 Development of architectural solutions	The investor develops a detailed project incorporating smart technologies. The authorities facilitate the rapid acquisition of approvals through the electronic system «EDESSB»	Research on the digitalization of management and the development of smart infrastructure by V. Kruhlov [8]	A construction plan approved for implementation is created. The risk of engineering errors is reduced thanks to digital registers
11	K.4.2 Approval by SES authorities			
12	K.4.3 Obtaining permits through the EDESSB			

End to table 3

1	2	3	4	5
Stage 5. Capital construction				
13	K.5.1 Execution of zero-cycle works	Business attracts contractor's funds and builds the facility. The authorities monitor the quality of works and ensure the laying of municipal water supply networks to the site	Law of Ukraine «On Concession» dated October 3, 2019, № 155-IX, analysis of contract mechanisms by V. Sychova [10]	The facility is built and commissioned. The risk of construction material price increases is entirely transferred to the investor
14	K.5.2 Installation of engineering systems			
15	K.5.3 Connection to municipal utilities			
Stage 6. Synchronized operation				
16	K.6.1 Functioning in shelter mode	The authorities use the facility free of charge for the needs of the school during air raid alerts. Business leases the space as a modern parking lot or coworking space during peacetime	Macroeconomic models of payback and joint profit by O. Suntsova [7] and the resilience concept by N. Khoma [5]	The city ensures the physical protection of the population, and business receives a stable income. All financial risks are balanced
17	K.6.2 Commercial use of space			
18	K.6.3 Technical maintenance of systems			

Source: formed by author

the process. During the implementation of the block Stage 1 «Needs analysis and concept preparation», local authorities initiate work through Step K.1.1 «Audit of the existing stock of protective structures» to record the actual deficit of safety spaces. The subsequent Step K.1.2 «Land allocation» serves as a kind of initial investment by the local authorities in the project, while Step K.1.3 «Development of a feasibility study» establishes the basic financial parameters of the future facility. At this stage, businesses evaluate the commercial attractiveness of the location and draw up a preliminary cost estimate. V. Vakulenko's research [2] confirms the significant limitations of local authorities regarding available funds; therefore, such high-quality initial preparation makes the location attractive to big business. In accordance with the Law of Ukraine «On Local Self-Government in Ukraine», a clear public request is formulated, and the risk of lack of demand is mitigated through open dialogue with community residents. During the implementation of Stage 2 «Transparent investment competition», the community initiates Step K.2.1 «Publication of conditions on the Prozorro.Sale platform» [18]. The use of this electronic trading system completely eliminates shadow deals, which B. Kosovych [4] rightly warned against in his works on anti-corruption activities. The proposed approach is also consistent with the provisions of Draft Law № 7508 regarding the simplification of procedures. The next Step K.2.2 «Evaluation of submitted financial models» allows the city to choose the most advantageous proposal from private developers who openly compete for the right to build the facility. The final action for this stage is Step K.2.3 «Conclusion of a partnership agreement». Thanks to the automated electronic bidding system, corruption risks are entirely eliminated, enabling the city to select a truly reliable private partner. Further work involves transitioning to the critically important block Stage 3 «International expertise and scoring». The defining element in this process is Step K.3.1 «Evaluation according to «PIERS» criteria», which documents the social orientation of the idea in accordance with O. Lutsevych's concept [3] and the requirements of the State Building Norms (DBN V.2.2-5-2023). At this stage, engaged auditors assess the project for compliance with sustainable development goals. The implementation of Step K.3.2 «Project registration in the «DREAM» [19] Ecosystem»makes the project transparent to the international community and reduces the risk of constructing a substandard facility due to absolute data openness. This significantly facilitates Step

K.3.3 «Attraction of grant co-financing» and provides the initiative with reliable safety confirmation from donors. The execution of all guarantees allows for the commencement of Stage 4 «Engineering design». The investor undertakes Step K.4.1 «Development of architectural solutions», mandatorily incorporating smart technologies, as substantiated in V. Kruhlov's studies [8]. The subsequent Step K.4.2 «Approval by SES authorities» (state emergency service) ensures full compliance with state building norms. Additionally, Step K.4.3 «Obtaining permits through the EDESSB» [20] (Unified state electronic system in the construction sector) frees the process from paper bureaucracy thanks to the digitalization of services. Interaction through electronic registers allows for the creation of a building plan that is fully approved for implementation and significantly reduces the risk of engineering errors. The availability of ready documentation enables the developer to begin Stage 5 «Capital construction». During the realization of this phase, Step K.5.1 «Execution of zero-cycle works» and Step K.5.2 «Installation of engineering systems» are financed directly by the private partner. According to the concession logic of risk management described by V. Sychova [10] and enshrined in the Law of Ukraine «On Concession» dated October 3, 2019, № 155-IX, the risk of construction material price increases is entirely transferred to the investor. Local leadership promptly executes Step K.5.3 «Connection to municipal utilities» by laying water supply networks to the site, after which the facility is commissioned. The final Stage 6 «Synchronized operation» takes into account the interests of both parties. Step K.6.1 «Functioning in shelter mode» is intended for the protection of people, granting the city the right to free use of the structure for the needs of a local school during air raid alerts. Additionally, Step K.6.2 «Commercial use of space» ensures cost recovery according to O. Suntsova's models [7], enabling businesses to lease the premises as a modern parking lot or coworking space during safe periods. The regular Step K.6.3 «Technical maintenance of systems» contributes to the stable operation of the facility in line with N. Khoma's resilience criteria [5]. As a result, the city guarantees the physical protection of the population, businesses receive a stable income, and all financial risks are reliably balanced.

Conclusions. The study of the mechanisms for implementing public-private partnerships within the civil protection system allows for the following conclusions. The vector of public-private relations is gradually shifting toward socially significant projects rather than purely commercial infrastructure. Under martial law and significant local budget deficits, attracting private capital is precisely what can facilitate the rapid construction of protective structures. The introduction of new regulatory changes aimed at simplifying procedures and increasing the flexibility of property rights creates a solid legal foundation for initiating investment processes at the territorial community level. The expediency of applying the international project evaluation methodology «PIERS» has been confirmed. Its implementation ensures the observance of the rights of people with limited mobility, enhances the environmental safety of the facilities, and promotes transparency in decision-making. This practice expands municipalitie's capabilities to attract concessional funding from international financial organizations. The technical capacity to construct autonomous underground spaces within reasonable timeframes has already been proven by the experience of frontline cities. Extending this practice to other regions requires the use of cross-subsidization mechanisms, where security expenditures are compensated by revenues from the peacetime operation of the facilities. The proposed authorial six-stage model for attracting private capital provides a ready-to-use managerial algorithm for local authorities. It clearly demonstrates how the transparent allocation of responsibilities between local governments and investors, utilizing modern electronic services, can mitigate construction risks for municipal budgets. Future research should focus on developing unified computational models to assess the return on investment for underground spaces of varying capacities, as well as on establishing state mechanisms for insuring businesses against the risks of property damage during the construction phase.

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