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**MODELS AND METHODS OF THE TECHNOLOGICAL MATURITY
DEVELOPMENT OF SELF-MANAGED ORGANIZATIONS IN THE CONTEXT OF USING
THE SYNCRETIC METHODOLOGY**

Abstract

Introduction. Infrastructure restoration projects of Ukraine are being implemented in the difficult conditions of war and many challenges. To increase the effectiveness of their implementation, project-oriented organizations need an effective management system. At the same time, it is necessary not only to apply innovative models and methods of project management developed by the world's leading organizations and companies, but also to create our own scientific developments, taking into account complex environmental conditions. Since restoration projects are related to the construction industry, which is one of the locomotives of the Ukraine's economy development as a whole. Therefore, the development of new models and methods of increasing the effectiveness of project-oriented organizations is an urgent scientific task.

Problem statement. The problems of management systems development of project-oriented organizations implementing restoration projects using modern (including syncretic) project management methodologies are described. The need to improve the efficiency of such management systems is emphasized. The importance of developing a syncretic maturity model for use by project-oriented organizations for the implementation of recovery projects within the syncretic project management methodology is substantiated. The scientific task of developing a model of syncretic maturity in the field of project management for use in the researched type of projects is formulated.

Purpose. Development of the technological maturity model for self-managed organizations in the context of the syncretic methodology use in the implementation of infrastructure restoration projects by such organizations, and models and methods set identification for syncretic technological maturity development in project management.

Materials and methods. To achieve the goal, the following models and methods were used: research of literary sources, methods of analysis and synthesis, models and methods of classification and structuring, models of technological maturity, methods of identification. The materials for the analysis were projects and portfolios of infrastructure restoration projects, the implementation of which is overseen by the State Agency for Reconstruction and Development of Infrastructure of Ukraine (SARDI).

The results. In the further development of Harold Kerzner's technological maturity model, the Syncretic Technological Maturity Model (SMMM) in project management is proposed. The model includes seven levels of technological maturity: syncretic language, syncretic processes, integrated (project and operational) processes, a singular project methodology, a singular integrated methodology, integrated benchmarking (the process of borrowing and implementing best practices), continuous integrated improvements. A graphical view of the model is provided. A set of models and methods are proposed that are required to achieve each level of technological maturity according to the SMMM model. As well as the multitude of models and methods that must be used to stay at the current level of maturity.

Conclusions. The development of new models and methods of improving the efficiency of restoration project management systems is an urgent scientific and practically significant task. Within the proposed syncretic approach, this article has developed a Syncretic Technological Maturity Model in project management for use by self-managed organizations in infrastructure restoration projects in Ukraine. Models and methods of transition to each subsequent level of syncretic maturity are described, as well as models and methods, the use of which allows you to stay at the current level. The use of these models is designed to

streamline and systematize the project management system of project-oriented organizations implementing restoration projects, which can increase the transparency, flexibility, efficiency and effectiveness of such management systems. A SWOT analysis of the proposed models was conducted, which proved the prospects of the studied approaches. Prospects for further research in the chosen direction are outlined.

Keywords: infrastructure restoration projects, program and project management, maturity model, syncretic methodology, self-managed organization.

Introduction

The development of project management remains relevant even in spite of today's tough conditions for the implementation of projects, which are primarily determined by the armed aggression of the Russian Federation against Ukraine, as well as the chaos of the project environment and accelerated multi-vector digitalization with the increasing dominance of artificial intelligence elements. Moreover, the relevance of such development only increases, and the complex conditions of project implementation only increase the relevance of scientific research in the direction of optimization of the main parameters of the project. The requirements for time, budget, quality, and risks of the project remain as required by the customers, despite all the troubles caused by the increasing entropy of the environment.

In this context, the development of new models, methods, methodological approaches to ensure the survival and success of modern projects — receives a new impetus to relevance. Such developments become even more relevant in the context of application to the infrastructure restoration projects of Ukraine, which in themselves are one of the most relevant for the economy of Ukraine, as they are the locomotive of a many industries development.

However, the project management implemented in project-oriented organizations is often met with resistance, shortcomings of implementation, distortion of the applied models and methods. Companies and organizations implementing projects and project portfolios are evolving in knowledge, skills and abilities regarding effective project activities. Their maturity in the application of effective project management is gradually increasing. However, models of accelerated evolution, faster acquisition of maturity in the field of project management have been developed and exist. The adaptation of such models to project-oriented organizations implementing projects in the field of infrastructure restoration of Ukraine is an urgent scientific task. This article will be devoted to the development of models and methods of increasing the technological maturity of such organizations, taking into account their application of a set of modern approaches and project management methodologies (including syncretism, self-management, value-oriented management, etc.).

Literature review

Methodologies and standards in the field of project management, programs and project portfolios from the beginning of their publication until the latest current versions paid attention to the issue of project management development in companies, organizations and institutions. One of the vectors of such development was the improvement of the organizational management structure. From functional, which is poorly adapted to the implementation of effective project activities, to strong matrix, and later to composite [2]. The goal of this vector of development is the gradual evolution of project management processes in the organization, the spread of corporate culture in the direction of effective coexistence of two aspects of the company's activities — operational (everyday) and project. Another vector is the institutionalization of project management processes, their formalization in the form of guidelines and corporate standards, and further automation (in the form of executed business processes) within the corporate IT system. An example of such institutionalization, in particular, can be considered a new recommended dimension (field of knowledge) in project management – Sustainability, as well as proposed models and methods of its provision [3]. The third vector of development can be defined as the emergence and integration of a standard such as Agile [4] into general project management. This methodology brought insight into the necessary balance between overly formalized project management processes and the necessary adaptability of the management system to the rapidly changing project environment. The fourth determining vector of the development of

project management in organizations should be considered the use of innovative organizational models and methods. This includes, in particular, models of self-managed project teams, the use of which can potentially increase the efficiency of project activities [5]. As well as one that was developed on this basis, the methodological direction of holacratic management [6] and its application to increase the efficiency of organizational management systems [7].

The evolution of the specified development vectors of project management led to the emergence of an understanding of the need for a comprehensive assessment of the development of a project-oriented organization in the field of project management (regarding the management of projects and their aggregates in the form of project programs and project portfolios). In response to this challenge, the concept of Maturity Model appeared, which was initially applied to IT companies and determined the level of maturity of such companies from the point of view of systemic attention to the processes implemented by the IT company [8]. The direction of research that combines (adapts) the taxonomy of technological maturity and the Agile methodology, in particular when applied to its most common framework Scrum [9], draws attention. Recently, another improvement of the CMMI (Capability Maturity Model Integration) model took place, in which new practical fields and practices were added [10]. The emergence of the technological maturity model led to the emergence of scientific research in the field of its application and systematization [11, 12], as well as interpretation in the field of project and program management [13].

The PMMM or P3M (Project Management Maturity Model) model by Harold Kerzner [14, 15] should be considered the most significant methodological development in this context. This model presents five levels of technological maturity of companies in the field of project management: Common language (Level 1), Common processes (Level 2), Singular methodology (Level 3), Benchmarking (Level 4), Continuous improvements (Level 5). The model assumes that the transition between levels should take place: from level 1 to level 2 — through the use of basic knowledge of project management; from level 2 to level 3 — through the identification and description of processes; from level 3 to level 4 — through the process management; from level 4 to level 5 — through the improvement of project management processes in a project-oriented organization. Studies of the PMMM model have an applied nature according to the field of application [16], to a combination with value-oriented management [17] and a general, integral approach to the structuring of project management systems in the organization [18]. Finally, thanks to the synergy from the development of the CMMI and PMMM models, the corresponding standard of the International Organization for Standardization ISO was improved [19].

It is expedient to use the mentioned developments in the context of their introduction into the system of project management and portfolios of infrastructure restoration projects of Ukraine. To manage such projects, the authors propose a syncretic methodology that allows individual projects from the project portfolio to be guided by their own methodology [20], which is important for large-scale projects with a large number of participants, some of whom may represent different countries and, accordingly, different cultures and project management standards. In particular, the syncretic methodology involves its use by self-managed teams, as well as project-oriented organizations that partially or fully use elements of self-management in the management system [21]. Therefore, such a methodology can be considered synthetic, combining project management, a value approach, models of self-management and syncretic principles. The prioritization of relevant projects [22] can be considered an important practical task in the field of infrastructure restoration, since the scale of the destruction caused by the war requires the implementation of a larger number of projects for the available financial capabilities. And therefore, the development of technological maturity of project-oriented organizations that will participate in infrastructure restoration projects will contribute to the improvement of their management system based on the implementation of innovative methodological approaches for a better and faster solution of their tasks and the achievement of their goals, in particular, with regard to obtaining the expected values by all stakeholders.

The conducted analysis substantiates the relevance of conducting research on models and methods of developing the technological maturity of self-managed organizations in the context of using syncretic methodology for projects (portfolios of projects) of infrastructure restoration.

Main part

In the context of syncretic methodology development, Harold Kerzner's Project Management Technology Maturity Model (PMMM) requires interpretation and refinement for use in infrastructure rehabilitation projects. The syncretic methodology involves the improvement of the entire set of processes of a project-oriented organization — both project-related, related to the implementation of projects and their aggregates, and operational, related to the implementation of economic activities and activities related to the provision of a project-oriented organization (including IT processes). Therefore, the PMMM model should be improved taking into account the full spectrum of the organization's processes. We will propose such a model in the form of the Syncretic Management Maturity Model (SMMM). We will propose 7 steps of technological maturity, in particular, we will divide the second and third levels of the PMMM model into two levels in the SMMM model. The structure of the SMMM model and its comparison with Harold Kerzner's model are shown in **Fig. 1**.

According to the proposed SMMM model, technological maturity is proposed to be determined by seven levels, in particular:

— *Level 1. Syncretic language*. At this level, the terminological base of syncretic project management methodology in a project-oriented organization should be formed. Formally, this can be implemented through the creation, agreement, approval and publication of the Syncretic Management Glossary on the company's network resource.

— *Level 2. Syncretic processes*. At this level, project management processes based on the use of syncretic methodology should be described. In the case of the existence of a project office in a project-oriented organization (corresponding to a matrix or composite organizational structure), the implementation of the project portfolio should take place through the core of a syncretic methodology that transforms information flows from and to projects that are governed by their own methodologies. Thus, the processes of interaction of the syncretic core with projects should also be described. Syncretism can also occur between different parts of medium or large projects of a project-oriented organization.

— *Level 3. Integrated P&O processes*. At this level, all processes of a project-oriented organization should be described. That is, in addition to the project management processes described at the previous level, operational management processes should also be formalized. Among such processes, as a rule, the following types are distinguished — financial processes, document flow processes, support processes, HR processes, IT support processes, etc.

— *Level 4. Singular project methodology*. At this level, a syncretic project management methodology in a project-oriented organization should be developed, agreed and approved. Other artifacts of syncretic methodology should be added to the described project management processes — templates, models, methods, tools, corporate culture (as a document), etc.

— *Level 5. Singular integrated methodology*. At this level, a project-oriented organization should develop, agree and approve a comprehensive organization management methodology, taking into account the synergistic interaction of syncretic project management methodology and operational activity management methodology. A unified methodology should describe templates, models, methods, tools, and other artifacts of both areas of activity of a project-oriented organization (operational and project), as well as the relationship and coordination of these areas within the framework of a unified methodology.

— *Level 6. Integrated benchmarking*. This level involves the description and implementation of a separate higher-level process — a process related to the use of best practices for process improvement and other artifacts of a single methodology of a project-oriented organization. At the same time, the corresponding process (benchmarking) should provide for the analysis of best practices (both inside the project-oriented organization and externally — from other participants in the relevant industry, as well as in other industries), its systematization, preparation for implementation in the form of a micro-project, and also directly implementation. It is important that the best experience should be borrowed and implemented in all areas of activity of a project-oriented organization (in all processes) — project processes, IT processes, support processes, etc.

— *Level 7. Continuous integrated improvement.* At this level, continuous improvement of the processes of both syncretic project management and operational management, as well as the interaction between these processes, should take place. Continuous improvement should also be institutionalized as a separate process. Consistency here should be embodied in the established periodicity of the implementation of such improvements. The integration of such improvements implies their implementation in a complex, taking into account the effects on all subsystems of the project-oriented organization. The goal of the improvements is to maximize the positive effect of the introduced influences.

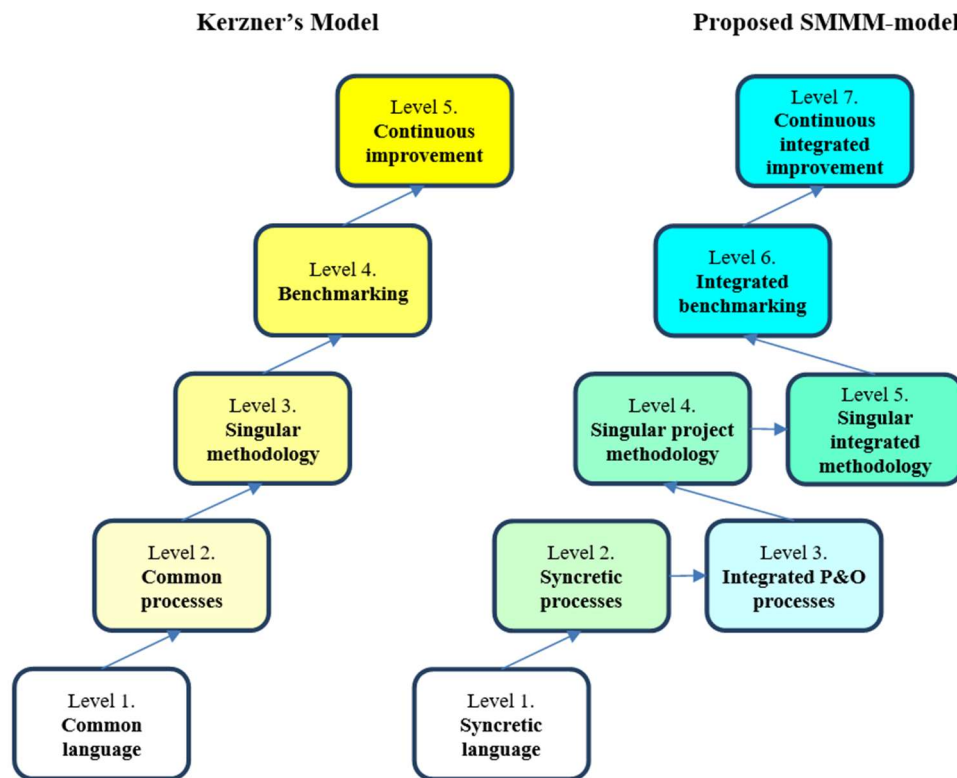


Figure 1 — Comparison of the proposed Syncretic Management Maturity Model and the Kerzner model on the basis of which it is built

The transition between levels can occur sometimes after the acquisition of the previous level, upon fulfillment of a certain set of conditions — which determine being at the next level of technological maturity. As an assumption, it can be noted that the acquisition of each subsequent level of technological maturity can occur no earlier than six months after the acquisition of the previous level.

Next, we will offer a set of models and methods that are needed to acquire each level of technological maturity. As well as a set of models and methods that must be used to stay at the current level of maturity (**Table 1**). It is worth noting that for the last (seventh) level of technological maturity in the field of integrated syncretic management, no models and methods for transition to the next level have been provided. They can be proposed in the further development of these studies, in the context of supplementing and developing the proposed model of technological maturity in the direction of adding the next levels.

Let's conduct a SWOT analysis of the proposed syncretic management maturity model (SMMM) for use in infrastructure restoration projects by self-managed organizations managed by syncretic methodology. Let's highlight their strengths, weaknesses, opportunities arising from their application, and threats that may arise.

Table 1

The set of models and methods that ensure the syncretic maturity in a project-oriented organization

No.	Syncretic maturity level	Models and methods that ensure staying at this level	Models and methods that ensure the transition to the next level
1	Syncretic language	Classification models. Methods of analysis, synthesis and systematization.	Models of project management processes. Models and methods of personnel training and development.
2	Syncretic processes	Process description models. Models of project management processes. Models of syncretism. Process regulation methods.	Models of financial accounting, document flow, other operational management processes. Models and methods of personnel training and development.
3	Integrated P&O processes (project and operational)	Process description models. Models of operational management processes. Models of syncretism. Process regulation methods.	Models of values. Models and methods of personnel training and development.
4	Singular project methodology	Classification models. Methods of analysis, synthesis and systematization. Models of tailoring.	Models of values. Value management methods. Models and methods of personnel training and development.
5	Singular integrated methodology (project and operational)	Classification models. Methods of analysis, synthesis, integration and systematization. Models of tailoring.	Models of self-management. Benchmarking models. Models and methods of personnel training and development.
6	Integrated benchmarking	Benchmarking models. Methods of using artificial intelligence.	Models of self-management. Holacratic management development methods. Methods of using artificial intelligence. Models and methods of personnel training and development.
7	Continuous integrated improvement	Models and methods of holacratic management, value-oriented management, syncretic approach and development of synergism.	—

Strengths

S1. The model is a foundation and a guide for the growth of knowledge, skills and abilities of project-oriented organizations in effective project management, which uses innovative models, methods and methodologies.

S2. Taking into account not only project management, but also operational management. In this way, the growth of maturity occurs evenly, without distortions. At the same time, both subsystems support and stimulate each other's development.

S3. The syncretic nature of the proposed approaches allows you to jointly and effectively use disparate methodologies in one management system of a project-oriented organization. It is an important property for the studied projects of the infrastructure restoration.

Weakness

W1. The model is not tested, during its implementation, additional complications may arise, which will require making changes to the model itself.

W2. Insufficient maturity of the staff of a certain number (estimated, a significant number) of project-oriented organizations in the researched field, for a deep understanding and effective application of this model.

W3. Methodological overload of the model – different in nature, although innovative in essence, approaches and methodologies are used.

Opportunities

O1. The possibility of ensuring the gradual and continuous development of the syncretic technological maturity of the project-oriented organization where SMMM will be implemented.

O2. The proposed model is able to provide conditions for a constant increase in the efficiency of project implementation — not only in terms of the projects' ability to meet limitations in the implementation time, budget and quality of the project's product, but also in terms of the achievement of values by all project stakeholders.

O3. Adaptability by nature, the possibility of improving the model on the one hand, and adjusting it (thanks to tailoring models) to the conditions of the project-oriented organization where the specified model will be implemented — on the other hand.

Threats

T1. The threat of force majeure, as a result of which the use of innovative technologies (in particular, the proposed SMMM model) will be less relevant than crisis management. For example, as a result of the escalation of the war caused by the aggression of the Russian Federation against Ukraine. In this case, the priority of the infrastructure restoration projects themselves may also be at risk.

T2. Inefficient implementation of the proposed model (due to various reasons, external and internal in nature) may lead to the discrediting of the vector of methodological growth in a syncretic context, which may cause a loss of relevance regarding its application.

T3. The threat of the emergence of more developed analogues of the model, which can be presented by well-known institutions in project management, as a result of which the novelty and innovativeness of the model will be refuted, and the model itself will remain unclaimed.

Based on the results of the SWOT analysis, it can be concluded that when using the capabilities of the proposed syncretic management maturity model (SMMM) in restoration projects (which are implemented by self-managed organizations using syncretic methodology), its threats can be overcome, and its advantages outweigh the corresponding disadvantages.

Conclusions

New complex times and war conditions require new, improved approaches and models of project implementation. Infrastructure restoration projects of Ukraine are one of the locomotives of economic recovery and development, therefore increasing the efficiency of such projects is an important practical task. And the development of new models and methods of their implementation, methodological approaches to improving the activities of project-oriented organizations, which will implement restoration projects, is a relevant and urgent scientific task.

In this article, a scientific task is set, an analysis of literary sources in the chosen direction is carried out, and, in the further development of Harold Kerzner's model of technological maturity, the Syncretic Management Maturity Model (SMMM) is proposed. The model includes seven levels of technological maturity: Syncretic language, Syncretic processes, Integrated P&O processes, Singular project methodology, Singular integrated methodology, Integrated benchmarking, Continuous integrated improvement. A graphical view of the model is provided. A set of models and methods are proposed that are required to achieve each level of technological maturity according to the SMMM model. As well as the set of models and methods that must be used to stay at the current level of maturity. A SWOT analysis of the proposed model was conducted, which confirmed its high potential for implementation.

Let's formulate the prospects for further research in the chosen direction based on the results of the conducted research: formalization and description of models and methods of each level of the SMMM model, formalization of transition processes from each level of the SMMM model to each subsequent level, implementation, approval and adjustment of the model SMMM, preparation of training models for personnel of project-oriented organizations to acquire the necessary competencies of each level of the SMMM model, further improvement of the model.

In general, the use of the proposed model by project-oriented organizations that will implement infrastructure restoration projects can increase their technological maturity in the field of project management, which will potentially contribute not only to the projects' compliance with time constraints, budget and project product quality, but also to the achievement of values by all stakeholders project. This, as a multiplier, will contribute to the accelerated development of the economy and, indirectly, to the approaching victory of Ukraine in the war.

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МОДЕЛІ І МЕТОДИ РОЗВИТКУ ТЕХНОЛОГІЧНОЇ ЗРІЛОСТІ САМОКЕРОВАНИХ ОРГАНІЗАЦІЙ В КОНТЕКСТІ ВИКОРИСТАННЯ СИНКРЕТИЧНОЇ МЕТОДОЛОГІЇ

Анотація

Вступ. Проекти відновлення інфраструктури України реалізуються у складних умовах війни і багатьох викликів. Для підвищення ефективності їхньої реалізації проектно-орієнтованим організаціям потрібна ефективна система управління. При цьому необхідно не тільки застосовувати інноваційні моделі і методи управління проектами, що розроблені у світі провідними організаціями і компаніями, але й створювати власні наукові напрацювання, з урахуванням складних умов навколишнього середовища. Оскільки проекти відновлення пов'язані з будівельною галуззю, яка є одним з локомотивів розвитку економіки України в цілому. А отже розроблення нових моделей і методів підвищення ефективності діяльності проектно-орієнтованих організацій є актуальною науковою задачею.

Проблематика. Обґрунтована проблематика розвитку систем управління проектно-орієнтованих організацій, що реалізують проекти відновлення з використанням сучасних (у т. ч. синкретичної) методологій управління проектами описана. Обґрунтована необхідність підвищення ефективності таких систем управління підкреслена. Обґрунтована важливість розроблення моделі

синкретичної зрілості для застосування проектно-орієнтованими організаціями для реалізації проєктів відновлення в межах синкретичної методології управління проєктами обґрунтована. Наукова задача розроблення моделі синкретичної зрілості у галузі управління проєктами для застосування у досліджуваному типі проєктів сформульована.

Мета. Розроблення моделі технологічної зрілості самокерованих організацій в контексті використання синкретичної методології при реалізації такими організаціями проєктів відновлення інфраструктури та ідентифікація множини моделей і методів розвитку синкретичної технологічної зрілості в управлінні проєктами.

Матеріали та методи. Для досягнення поставленої мети були використані наступні моделі та методи: дослідження літературних джерел, методи аналізу і синтезу, моделі та методи класифікації і структуризації, моделі технологічної зрілості, методи ідентифікації. Матеріалами для аналізу служили проєкти і портфелі проєктів відновлення інфраструктури, реалізацією яких опікується Державне агентство відновлення та розвитку інфраструктури України.

Результати. У подальший розвиток моделі технологічної зрілості Гарольда Керцнера, запропонована Модель синкретичної технологічної зрілості в управлінні проєктами. Модель включає сім рівнів технологічної зрілості: синкретична мова, синкретичні процеси, інтегровані (проєктні та операційні) процеси, єдина проєктна методологія, єдина інтегрована методологія, інтегрований бенчмаркінг (процес запозичення і впровадження кращого досвіду), безперервні інтегровані покращення. Надано графічний вигляд моделі. Запропонована множина моделей і методів, які потрібні для набуття кожного рівня технологічної зрілості відповідно до моделі SMMM. А також множина моделей і методів, які необхідно використовувати, щоб залишатися на поточному рівні зрілості.

Висновки. Розроблення нових моделей та методів підвищення ефективності систем управління проєктами відновлення є актуальним науковим і практично значимим завданням. У межах запропонованого, синкретичного підходу, в цій статті розроблено Модель синкретичної технологічної зрілості у управлінні проєктами для використання самокерованими організаціями в проєктах відновлення інфраструктури України. Описані моделі та методи переходу на кожен наступний рівень синкретичної зрілості, а також моделі та методи, використання яких дозволяє залишатися на поточному рівні. Використання зазначених моделей покликано впорядкувати і систематизувати систему управління проєктами проектно-орієнтованих організацій, що реалізують проєкти відновлення, що здатне підвищити прозорість, гнучкість, ефективність і результативність таких систем управління. Проведено SWOT-аналіз запропонованих моделей, який довів перспективність досліджуваних підходів. Окреслено перспективи подальших досліджень в обраному напрямку.

Ключові слова: проєкти відновлення інфраструктури, управління проєктами та програмами, модель технологічної зрілості, синкретична методологія, самокерована організація.