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**THE ROLE OF USING VALUE-ORIENTED MANAGEMENT
IN THE SCOPE OF CONSTRUCTION PROJECTS**

Abstract. *This paper describes the creation and methods of using a value-oriented approach in managing the scope of construction projects. In the framework of this approach, the following tasks are solved: the project's value management functions are determined, project value identification is underway, values of all project stakeholders are determined, structure of value is formed in the process of managing construction projects, principles of value creation are proposed at each stage of the construction project. Implementation of this methodology will help the decision makers to better understand their goals in the project and turn them into functional solutions. The article uses the following methods: P2M standard value approach, engineering values, value management. The processes (steps) of engineering value management were described in detail, as well as the method of "Five "E" and "Two "A" (the value approach of the standard P2M). The advantages of using the value approach as the basis for managing the scope of construction projects are characterized.*

Keywords: *value; value creation; value management; value-oriented management; value engineering; stakeholders; construction project*

Introduction

In recent years, the construction industry has intensified in Ukraine. Process management in a rapidly changing environment, the ability to adapt to reality in a timely manner, the ability to meet the modern requirements of customers acquires current importance.

The leadership of our state largely draws attention to the study of foreign experience in the formation of the regulatory framework of construction, including both technical and economic approaches, as well as attention on the use of advanced methods of managing the value (cost) of investment and construction projects. One of the urgent tasks today is the introduction of foreign experience into the management processes of domestic construction projects, in particular, the value approach of the Japanese P2M methodologies (Project and Program Management).

The main advantage of P2M in relation to other project management methodologies is that in P2M there is an emphasis on developing innovation as a value approach to project management and managing the expectations of key stakeholders. At the same time, a project in P2M is an obligation to create value based on the project's mission, which must be completed within a certain period within the agreed time, resources and operating conditions. Any project begins with the definition of its mission [1]. This distinguishes P2M from other project management standards, where they usually start by defining goals.

Value management or value-oriented management is a structured approach to determining the elements of value for organizing a construction project. These are processes that determine needs, problems and opportunities, which allow to improve initial goals, to determine approaches and solutions for optimizing the value of projects and their products.

Under the value of the construction project understand the criteria for meeting the needs of key stakeholders, namely, the customer, owner, investor, project team, contractors.

Different stakeholders of the construction project have different views on what is valuable to them in the project. The differences are due to the mentality, specific knowledge, goals, context and conditions that influence the concept of value for each stakeholder. Different stakeholders may also have similar interests and preferences regarding what is valuable in a project.

Meeting the goals of owners and users can be fundamental base of creating value through a project. Management and design processes can be decisive for achieving desired goals. Consequently, knowledge of what creates value applied in the management structure, will increase the value of product creation. Providing a base for value creation increasing in construction projects can be achieved by solving the following questions: 1) What tools and principles should be considered at the beginning of a project to ensure value creation? and 2) How can these principles be structured within a framework in order to maximize project value creation?

Analysis of last achievements and publications

In construction projects at the initial stage of project management, professional management methods are used. One of these methods is value-based management. Foreign and domestic experience in the field of project management shows that value-oriented management is an integral part of project planning. A large number of works and developments are devoted to this issue.

The Project Management Association in Japan (PMAJ) in P2M provides the following information. An important factor for success of the program is the intellectual space in which its stakeholders discuss common objectives, goals and areas of common interest, focusing on creating the value of the project (program). The project team operates according to the principles of disclosing the creative potential of all its participants, integrating the competence platform and the modern information system, shaping the atmosphere of the project team, with a focus on the common goal [1].

Today, the authors of publications in construction projects management pay attention to the formalization of influence description for the factors of external environment in each construction project, taking into account their instability, on the course of construction preparation and construction objects installation [2; 3].

The scientific works of such foreign scientists are devoted to the improvement of project management mechanisms, including in construction: (R. Archibald, H.Y. Varnack, C. Gray, M. Casson, K. Kent, A. Link, P. Morris, S. Ohara, M. Porter, J. Pinto, R. Rotberg, R. Foster, R. Hizrich, E. Jantsch and others). Balancing the interests of project participants in these works is not fully covered.

Researches of value-oriented approach to project management were conducted by S.D. Bushuev, N.S. Bushueva, F.A. Yaroshenko, H. Tanaka, I.A. Babaev, D.L. Volkov, Yu.M. Teslyar, V.V. Molokanova, V.B. Rogozin, M.I. Rich, R. Kaplan, T. Copeland, D. McTaggart, A.G. Mendrul, D. Norton, B. Newman, P. Pellemans, M. Rokich, T.V. Romanov, Y.M. Plotnik, I.V. Trifonov, J. Shet. The development of the theory of stakeholders involved such scientists as P. Gomez, V.V. Grabar, I.B. Gurkov, S. Miles, A. Mendalow, R. Mitchell, G. Savage, V.V. Sanin, C. Skolz, A. Friedman, R. Freeman, J. Fruman, A. Hillman, B. Holzer, A. Skachkov, I. Skachkova.

Among the scientist's works that are devoted to management issues in the development and implementation of the projects scope and projects life cycle, using value-oriented management, it should be noted works of M.K. Sukhonos, A.Y. Starostin, V.I. Chimshir, I.B. Azarova, O.O. Bugrova, T.G. Fesenko, T.G. Grigorian.

Muller and Turner believe that to measure success, it is necessary to focus on such factors as end-user's satisfaction, owner's satisfaction, project results, satisfaction of other stakeholders, achievement of project goals and identification of project values. [4].

Numerous models and approaches to ensure the development of the value approach in construction were given in the works of J. Kelly, D.D. Gransberg, J.S. Shane, M.H. Thyssen, J. Kelly indicates that value management in construction is explained as "a term used to describe the overall process of increasing customer value in a project from concept to operational exploitation and use" [5].

The report of Professor S.D. Bushueva unequivocally highlighted the main idea of the project activity – the obligation to create value, which reflects the essence of project activity's mission in its diversity. However, this approach does not establish how necessary this value is and how timely is its appearance.

The goal of the work

The research subject of this article is the processes of planning the scope of construction projects. The main goal of this work is to identify the links between main elements of construction project management by using a value approach and taking into account the values of stakeholders.

The purpose of the study is to apply the P2M value-oriented approach to the management of construction projects in the areas of stakeholder's interests in their construction project and compare this value management method with other methods, also to describe the use of value approach used in construction projects. And also to develop the theoretical, methodological and practical aspects of improving the system for managing construction projects.

Values have always been used in construction in one way or another, but inconsistently due to the lack of term definition. In most construction projects, values (needs, goals, expectations) are developed and described in brief form. Achieving of these values, determined by project's customer, and sometimes by project's users, is always the main goal of the construction project.

Highlight of the earlier unresolved parts of the general problem

Project stakeholders are those who are both at the project manager level and beyond, people like project team members and contractors, as well as clients and those who are directly or indirectly affected by the outcome of the project, for example, residents of the entire area in the case of large construction projects.

In construction projects, various stakeholders determine value from their own point of view. However, value creation depends on how needs are met for different stakeholders. Accordingly, we need to know

how “value” and “value creation” are defined. In addition, aspects of value management as a value-creating tool should be explored in order to incorporate existing knowledge on how to identify elements of value creation and how to manage a project to achieve them.

According to [6] one cannot ignore the fact that each interested part has its own value. However, according to [7], conscious value and value creation are the result of collaboration between all stakeholders and success in collaboration between members contributing to value creation for all stakeholders.

The first step in the process of value-oriented development of the system, according to P2M standard [1], is the description of mission, which defines vision of the dominant organizational value, on the basis of which corresponding strategy is developed. In addition, the strategy should be transformed into the main task of the construction project, which is divided into sub-goals corresponding to the priority aspects of the organization’s development. In the practice of value management, the following three functions are considered: value determination, value creation, value imposition. Identifying the value of project product or its result often means simply copying the value carrier.

Value management approach is based on the following principles:

- continuity of project value, measurement and evaluation tools, monitoring and control. In an organization, this principle forms value chains (vertical and horizontal);
- focusing on tasks before finding solutions that optimize the value of a construction project for key stakeholders;
- focusing on functions that maximize innovative and practical results within a project service model.

Introduction of value management begins with the stage of determining the value structure of an enterprise and describing values in behavioral manifestations for subsequent use in all management systems.

Main concepts of value-based managing of construction development projects are:

- mission definition (mission profiling), which is intended to increase the potential value of the project;
- developing a program architecture in which a group of projects that form a program can work autonomously, being integrated in managing to maximize the added value of a construction project;
- formation of construction’s project strategy, taking into account the vertical and horizontal chains of value formation;
- creation of criteria for assessing added value, obtained from the development’s project implementation;
- managing a community that serves as an intellectual space of value creation in a business environment.

Formation of organization’s values for construction project occurs spontaneously in development program through:

- gradual crystallization of shared values based on employee interaction experiences;
- acceptance by stakeholders of the values of informal leaders and authorities;
- copying impressive behaviors of other stakeholders;
- almost imperceptible changes in values as a result of changes in attitudes, motivation, life prospects.

Value creation requires fulfillment and alignment of user needs and owner strategies combined with innovative thinking. Focus on determining the value of stakeholders for value creation demonstrates the importance of aligning strategies with customer needs to maximize value creation. According to [8], the missing link in project planning and execution is clear project strategies and goals. Therefore, there is a need to clarify all these requirements for value creation through a systematic approach to determining priorities, measuring and monitoring the fulfillment of these requirements throughout the construction project.

Value of construction project is determined by the benefit that project’s product provides when fulfilling the requirements contained in the project’s mission. There are two necessary conditions that guarantee the creation of a project’s value. The first is the practical ability of the project manager to carry out the project in accordance with the plan; and second, finding a way to harmonize the value of the project for all stakeholders through the properties of the project product. The first condition is mandatory, while the second is a sufficient condition for creating the project’s value.

A construction project that satisfies these conditions can increase the value of an organization’s assets, create intellectual value and the value of innovation as a result of its implementation, because its product creates a new social value for society and the value for owners, also called value balancing the interests of interested parties, which highlights the value ownership of the project for each interested part and holds synergies for future profitable collaboration, where, in carrying out a project, it is necessary to skillfully balance the interests of the participants. For example, in the work [9] project value creation is rearranged by an empirical example, “how can one create value for several key groups of stakeholders at the same time”.

Project value planning is estimated based on criteria such as comparing project profits with established planned costs. Typical methods and indicators used for this assessment are: – CBA (Cost and Benefit Analysis), CF (Cash Flow), NPV (Net Present Value) and IRR (Internal Rate of Income) [10].

Consideration of material and methods

In management of construction project, value creation is the result of satisfying needs and performing the expected effects. To effectively create value, the value of users must be aligned with the owner's strategies. These elements must be identified to understand the value of the project. This understanding is necessary to create ideas on how to meet needs and strategies. Identifying user needs and owner strategies is challenging. One of the most common methods for identifying user needs is the process of user participation. One of the main problems in user participation processes is the lack of user's ability to recognize, articulate and balance their needs. The study also implies that too early user involvement may not be appropriate. Users must actively participate when a project team is formed. The project team, including the owner, can greatly contribute to identifying and harmonizing user needs and ownership strategies based on their experience and knowledge. This participation, in particular, is a requirement for life cycle thinking as part of construction project development.

The success of a construction project throughout life depends on the objectives of the meeting, as well as the achievement of long-term effects caused by the project. This requirement implies that identifying needs and strategic objectives, intangible criteria and achieving long-term effects are fundamental contributions to value's creation in a project.

Systematic assessment of value creation and the achievement of goals after a construction project's implementation is necessary to transfer knowledge about what creates value at the operational stage, and to use this knowledge in the design of future projects. In addition, it is clear that the need for a competent team and the early involvement of key resources for characterization of value are obvious. The team should be able to verify the project strategy and documents from the concept stage, as well as help to identify the elements of value creation for the project.

Value management must go through the following three steps [5]:

Development of value hierarchy. Value hierarchy is the method of accepting the main goals of the project and dividing them into their own subtasks. Each subtask is a means of the main goal achieving.

Development of values tree. This includes the process of weighing goals and sub-goals of values hierarchy that streamlines priorities among all conflicting requirements in a project. Weights are achieved by group consensus during the meeting.

Development of solution matrix. After weighting factors have been established for various goals and subtasks of the project, it is necessary to decide which of the options will provide the best value for comparison

with the goals, that is, to what extent they correspond to the goals set.

Many of the assessments obtained from the value management process will be subjective, but an important characteristic of value management is the fact that decisions are the unanimous opinion of all process's participants.

There are many mathematical theories to evaluate the value of a project. However, according to P2M, the "Five "E" and "Two "A" methods are the most appropriate and effective methods for assessing value. This method is increasingly used in corporations and is supported by them during implementation of project management [11].

It is useful to use indicators of "Five "E" and "Two "A" when developing primary indicators for evaluating a construction project, and also in terms of assessing its value.

"Five "E" (efficiency, effectiveness, earned value, ethics, ecology):

1) Resource efficiency in projects – determined by the ratio of benefits received from the project to the amount of used resources.

2) Effectiveness refers to the level of satisfaction of stakeholders before and after the project, as well as the scope of benefits based on certain effectiveness criteria.

3) Earned value – universal criteria for measuring the progress of projects, in which the project's plan is connected according to its schedule (schedule) and costs (resources).

4) Ethical Compliance – this is the response of the program community to the generally accepted, clear and correct idea of the project, its compliance with social and production standards and justification of the participants' ethical expectations.

5) Ecology – criteria to support the continuous growth of the organization or the continuous progress of the program, with due attention being paid to the protection of the environment.

"Two "A" (accountability, acceptability):

1) Accountability is determined by the level of management's responsibility for project / program results, including interim results obtained by stakeholders, as well as transparency, visibility and candor (publicity) in informing the public about the status of the project / program at the moment.

2) Acceptability is determined by a number of conditions that interested parts accepted according to the cost indicators of the program, expressed in the amount of invested capital, guarantees of return on investments and approved plans for distributing the cash flow of the program over time.

One of the methods of value management in a construction project is not only the P2M value approach, but also engineering of value.

When applied to the construction process, value engineering has a huge benefit for developers. The multi-step process is an integral part of the development phase and aims to increase the value. Engineering value serves as a creative search tool for the project team of the most logical and effective project's solutions. Focusing on maximizing of project function while minimizing costs creates the most value for customers.

An important part of the value planning process is the workshop. Held at the design stage of a project, an engineering workshop includes a project team, which considers the proposed project, performs a functional analysis of the object, receives a definition of the owner's value, determines key criteria for the project and proposes alternative solutions for the project.

The value engineering process has five basic steps [12]:

- Information: At the initial stage, the project team seeks to collect information about the project so far, including important information about the goals, key criteria and determining the value of the owners.

- Speculation: the team studies the data and brainstorms in as many ways as possible to reduce the initial cost or life cycle cost, while maximizing the function.

- Evaluation: team evaluates ideas received during brainstorming. Some ideas become part of the final decision, while others are considered ineffective or inoperable.

- Development. Many ideas that passed the evaluation stage were further developed in the work proposals. Each recommendation will be accompanied by a brief description containing a list of positive and negative aspects of each proposal, as well as a comparison of costs.

- Presentation: Finally, the team makes an official written presentation of its findings, followed by an oral presentation for customers, users and designers. At this final stage, the client can determine which cost management proposals will be include in the project in order to reduce expenses and decrease the total cost.

Benefits of value approach for construction project

The P2M value approach helps to maximize results for stakeholders by engaging them in the proses. And value based management is a management style based on value indicators for the sustainable development of a managed system. P2M explicitly states that during decision-making procedures development, the focus should be on the decision quality, taking into account the influence of the following elements: the process itself, information and criteria of value. Basis of value creation mechanism is its profiling, which implies an understanding of development and application of projects

and programs value structure that stimulate development of managed system or its characteristics based on innovation drivers.

Benefits of using P2M value approach:

- P2M value approach allows you to maximize and create project value consistently;

- Coordinates user's interests with project stakeholders;

- Facilitates communication with investors, analysts and communication with stakeholders;

- Establishes clear management priorities;

- Improves decision making;

- Improves resource allocation;

- Continuous valuation.

The basic principles of building value determine a rational way of developing the effectiveness of innovative programs, helping to reduce uncertainty and costs.

Value management (VM) optimizes mutual understanding between customer and users to ensure that needs and expectations are met at the same time based on priorities. This subsequently provides a systematic basis for decision making throughout the project's life cycle in terms of value and function.

VM provides clarity of a brief project description that improves interaction between stakeholders to mitigate collisions resulting from constraints on project expectations and requirements. This continuous process at the same time ensures that the project will be implemented in the most profitable way, meeting the needs of the business.

Functionally, the VM provides the basis for design development, which includes the proses of study and development of materials, which will provide improved technical solutions with improved characteristics and quality.

The value and benefits are closely related, while the benefits are aimed at achieving value for projects, the ultimate goal of a VM is to create value for the construction parties, the project and the client.

Benefits of engineering value using.

The time, spent on engineering the value, gives impressive results. The time spent on the process at the initial planning stages has little effect on the final project schedule and redesign costs. An independent team brings a new perspective to the project based on their professional construction experience. Customers who defined initial value criteria in the information phase, increased satisfaction with the final product while reducing the total project cost. Finally, the project usually has less changes and delays throughout the construction process, as well as greater functionality and value for the end customer.

Despite the fact that value development began as a cost-saving measure, it becomes a valuable project management technology that takes into account all

aspects of the life cycle of a building from its initial construction due to the stability of the source materials and the efficiency of using the final project. The project team can bring positive environmental and social consequences for the solution, including methods to reduce carbon dioxide emissions during transportation, construction and operation, as well as suggestions that positively affect the safety and well-being of the surrounding community.

Study results and their discussion

A feature of this study is to provide a framework for increasing value creation in construction projects by addressing the following issues: 1) What tools and principles should be considered at the beginning of a project to ensure value creation? and 2) How can these principles be structured within a framework in order to maximize project value creation?

Regarding the first question, the results of the study revealed a wide range of principles that should be considered for creating value in construction projects, as well as limitations and problems that may limit the creation of value. At the early stage of projects, the need for improved communication with the owner, the definition of values menu that helps decision makers to choose a level of ambition and the need for a clear project strategy, indicates a deep need for careful strategic analysis at an early stage.

The study also showed that value is created when owner's strategies are aligned with user needs, and both are executed. On the other hand, users often do not know their needs. The competence and experience of the project team can make a positive contribution for identifying needs and creating elements of value.

The second question was to structure these principles in a framework to maximize value creation. The study showed, among other things, that within the framework of the structure, consideration should be given to identifying and understanding what creates value for the user and the owner during the operation phase of the project and use this knowledge at the design stage (feasibility study and determination). In this case, the structure should also contain a process for evaluating value propositions and providing value, so that the identified elements are evaluated and implemented, as expected, throughout the project's life cycle from idea creation to obsolescence.

The ultimate goal of this study is to create a framework for understanding the strategic needs of owners and users and translating them into buildings that create value, by referring to 1) What are the principles that need to be considered in front of a project to ensure safety, create maximum value for stakeholders in a project life cycle perspective?

2) How these principles can be structured in a framework to maximize project value creation?

A study of the literature has shown that value creation in the perspective of a building's life cycle depends mainly on two factors; 1. performance of users' needs; 2. implementation of the owner's corporate strategy. Further research has shown that these two factors need to be combined with innovative thinking in order to add value to the project. Lifelong success depends on meeting goals (both material and time, cost and quality, as well as less tangible criteria), as well as achieving long-term effects caused by the project. This requirement implies that identifying needs and strategic objectives, intangible criteria and achieving long-term effects are fundamental contributions to value creation in a project.

The second treatment question regarding the structuring of identified principles for creating value in order to maximize value creation led to a value approach from an optimal point of view, which was developed with focusing on solving some practical problems faced by projects and obstacles to value creation. The framework proposes a structure that uses principles that need to be considered in order to increase value creation at each stage of the project, including the phase of operations. The framework also presents a method that allows the project to move the focus from the point of view of construction's completion to the prospect of construction's building. Implementation of this methodology will help decision makers to shift the focus from what is best for the project, to what is best for users and owners.

Conclusion and perspectives of further development

This article shows that joint projects in which the team is organized and assembled at an early stage, and contractors are involved in the design stage, have the best chance of success. Involving a team as early as possible can have benefits such as their participation in determining what creates value for a construction project, and the opportunity to test the project strategy and concept of phase documents. Actions that create value for a construction project can be defined as actions aimed at achieving value that satisfy the needs of people, industry and society that are carried out by an individual or a group of people based on intellectual, physical and financial resources. Innovation and new ideas are also a requirement to offer better solutions and descriptions to meet identified needs and thereby create value.

Obtained scientific results are of great theoretical and practical importance. However, despite the diversity of works devoted to the management of construction projects and their improvement, currently, a number of aspects in determining the effectiveness of the implementation of joint projects of building business structures are not fully investigated.

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РОЛЬ ВИКОРИСТАННЯ ЦІННІСНО-ОРІЄНТОВАНОГО УПРАВЛІННЯ ЗМІСТОМ БУДІВЕЛЬНИХ ПРОЄКТІВ

Анотація. Розглянуто розглянуто створення та методи використання ціннісно-орієнтованого підходу в управлінні змістом будівельних проєктів. В рамках запропонованого підходу вирішуються такі завдання: визначаються функції управління цінністю проєкту, проводиться ідентифікація цінності проєкту, визначаються цінності всіх стейкхолдерів проєкту, формується структура цінності в процесі управління будівельними проєктами, пропонуються принципи створення цінності на кожному етапі будівельного проєкту. Впровадження цієї методології допоможе стейкхолдерам, які приймають рішення, краще зрозуміти свої цілі в проєкті і перетворити їх в функціональні рішення. Використано такі методи: ціннісний підхід стандарту P2M, інжиніринг цінності, ціннісне управління. Докладно описано процеси (етапи) управління інжинірингом цінності і методу П'ять "Е" і два "А" (ціннісного підходу стандарту P2M). Охарактеризовано переваги використання ціннісного підходу як основи управління змістом будівельних проєктів.

Ключові слова: цінність; створення цінності; управління цінністю; ціннісно-орієнтоване управління; ціннісна інженерія; зацікавлені сторони; будівельний проєкт

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