Modern technologies of project management and implementation in the construction industry

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Abstract. The article considers the technology of management and implementation of project activities, from the perspective of project management in the field of innovation and multifunctionality of work in the field of construction and production. The current existing approaches to project management in various manufacturing fields and also such special tools as the construction extension of project management standards have been examined. As follows from the analysis, the main features of the considered standards are highlighted and conclusions were reached on the necessity to use modern technologies in project management.

1. Introduction
Nowadays the problem of project management and implementation technologies in the construction industry, especially as part of infrastructure development, is a complex task. Information technologies and specialized software are increasingly used in the modern construction business.

The modern market of construction activities is characterized by active participation of foreign firms, investors, architects, designers, implementation of new design and construction technologies and equipment, new construction and finishing materials and expansion of activities. The issue of development, and most importantly, the introduction of new construction technologies in practice instead of the previous ones is becoming an increasingly urgent component.

2. Project management
Project management is a set of measures to coordinate human, financial, information and material resources throughout the project cycle, aimed at achieving the project objectives. The whole set of operations for the implementation of the project is interconnected in time and space. Ensuring such a linkage of operations is a very difficult task.

Project management in the field of design of construction facilities is a systematic application of management methods and tools in order to produce sets of project documentation with high quality of design considerations and design, in volumes and in terms determined by the relevant contracts.

There are two necessary components of project management.

Revision Management. Design and detailed documentation of the project constantly changes and requires coordinated and orderly work of all participants of the construction. In view of this the effectiveness of the management of this process is characterized, first of all, by a regulated procedure for making changes and well-timed informing related departments. Sometimes the best solution is to create a Project Office at the construction site for these purposes.
Innovative approach. It is the visualization of design solutions using modern CAD programs. This means it became possible to work in a team using all options of 3D design. Automation allows each member of the team responsible for his structural element to exchange 3-D models with each other. The quality of project documentation increases many times using this possibility.

3. Types and examples of project management standards
The methods of project management and implementation technologies are numerous and diverse.

The current project management standards can be divided into national and expanded geography of application [3]. National standards are the standards of the following countries: France (AFITEP), Great Britain (APM Body of Knowledge, BSI BS 6079, OSCEng), Germany (DIN 69901, V-Modell), USA (NASA Project Management), Switzerland (VZPM).

Examples of standards with extended geography of application include the following: A Guide to the Project Management Body of Knowledge (PMBOK Guide); ISEB Project Management Syllabus; ISO 10006: 2003, Quality management systems - Guidelines for quality management in projects; Microsoft Solutions Framework (MSF); Oracle Application Implementation Method (AIM); PRINCE2 (Projects In a Controlled Environment) [3].

At the current stage of development special products, for example, software for project management become popular as a standard for project management and implementation. Services can be automated with the following products: Agresso; Augeo Software; BIM, CA Clarity; Epicor Software IRIS Software Group SharpOWL; Lawson; Maconomy Microsoft Project Professional. In Russia, Microsoft's Project Professional software products have become widespread.

However, it should be noted that primarily methods of project management are general purpose. Only a few of them, such as PMBOK and EUPS (Eurasian Project Management Standard) have specialized extensions for construction projects.

4. Modern project management standards and their features
The ANSI PMBDK GUIDE (APG) standard, which contains a fairly detailed description of generally accepted project management technologies, is meant to be used internationally. Project management processes are divided into five main groups: initiation, planning, execution, regulation and completion. These stages are similar to the PDCA methodology, but have a number of differences, in contrast to the Deming cycle, in other words, APG is primarily focused on the management of individual stages of the project, and not on the management of a set of projects that include integration processes. Therefore it is be noted that APG is dominated by the principles of effective control over the execution of the composed plan, GAP analysis of the actual progress from planned and timely reasonable adjustment targets. [4]

The approach to the development of tools for the competent setting of goals was QFD (QFD - Quality Function Deployment), which was proposed by the Japanese [4]. Firstly this method began to be used in the field of automotive engineering, and then began to spread in other different industries. The results of research and development of the American Institute of project management (PMI – Project Management Institute) have been disseminated to ensure a large increase in the level of regulation and management of resources. [5] The set of management tools offered by the Institute has gained worldwide distribution and recognition. [7]

However, not all classical approaches to project management are quite applicable to the implementation of projects related to the development of fundamentally new products or services. It is related to the fact that such projects are usually implemented in conditions of high uncertainty about their goals and content.

Changing the goals and content of the project has far-reaching consequences in the context of choosing effective management techniques. The classical project management tools for the case of innovative projects are losing their relevance.

Thus, in the conditions of rapid changes, continuous innovation activity on a global scale, there is an objective need to develop new, "non-classical" techniques that would better reflect the conditions.
of high uncertainty regarding the most important strategic issues. One of the answers to this objective necessity was the development of a new concept of project management Agile Project Management (APM).

APM is a "non-classical" approach to project management. This method of project management consists of many rapid iterative planning and development cycles, which are applicable to projects, allowing the project team to constantly evaluate the developing project and receive instant feedback from users and project participants. The team studies and improves project performance as well as the method of work in each successful cycle. After well-established planning, needs identification and solution outline, the stage is completed, with the project going through iterations with already more detailed planning processes, needs analysis and implementation, taking the form of waves.

In addition, the APM methodology allows us to approach the process from the point of view of situational moments, using diagnostic tools functions in the process. This approach allows for instant changes in the final product when new requirements are received. Firstly APM was positioned as an approach to project management in the field of information technology, but after a while it became clear that in the conditions of rapid changes in many areas of business, the scope of APM can be significantly expanded in areas such as: production and construction. [6] In the construction industry the APM methodology is used as a methodology for planning the stages of work from design to completion.

5. Features of project management and implementation for the construction industry
Project Management Institute Construction Extension to A Guide to the Project Management Body of Knowledge (PMBOK® guide)
Despite the growing interest in project management, the increase in the number of models and standards, the tendency to develop more accurate programs and standards for project management in the production sector, nowadays, only a few of them can offer extensions of special significance, directly for construction projects.

One such product is an Extension for the construction field of Project Management Institute Construction Extension. PMBOK is a framework. Many people call it the standard, but it's not quite true. Most people don't know what the PMBOK Guide is not a standard, in spite of the fact that PMI (Project Management Institute) stamp of the ANSI standard on cover, the standard is only Project Management Standard for Managing a Project, measuring just under 40 pages. The PMBOK manual itself is much more extensive – 616 pages (in the Russian edition 587).

After the publication of the third edition of the guide, there was a need to create separate extensions and bring them into full compliance with the standard itself. In this expansion, the basis is the norms and features generally accepted for construction projects, which are not common for the types of projects of different production areas. This extension also addresses specific practices and features found in construction projects. This Supplement applies the generally accepted PMBOK standards to the construction industry, and aims to improve the efficiency of project management in construction.

Construction projects involve a large number of people and often project teams speak different languages while in the same country. These facts complicate communications, and therefore slow down the work of the project.

Eurasian project management standard. Extension for the design of construction projects.
ESUP is an integrating standard developed by the professional community on the basis of world experience, values and goals of Eurasian civilization. Corporate project management standards are an important part of management systems in many successful companies. ESUP reflects the best practices in this area by developing a prototype of a corporate project management standard designed to be customized to a wide range of projects. As such this basic document contains the main provisions, which, if necessary, are detailed in the industry extensions and standards of organizations. [8]

The extension of the ECUP standard for the design of construction objects was developed with the aim of its use in design organizations and self-regulatory organizations for the design of construction
objects in the development of their own corporate standards for similar purposes and documents of quality management systems, taking into account the individual characteristics of such organizations.

Corporate expansion of the Eurasian standard of project management in the field of design of construction objects hereafter referred to as Esup_K_projection of construction objects is developed taking into account the world achievements of project management in this applied area. [8]

The main feature of the application of Esup_K_projection of construction projects for this area is the principal multiplicity of simultaneously executed projects, the totality of which is a single portfolio with many projects.

6. Conclusion

As a result of the conducted research it was found out that in the existing standards and literature there is no uniform approach to construction of the General system of project management. National standards exist in about 50 countries. In Russia there is no universally recognized national (state) standard. The PMI standard is popularized in Russia privately or as a public initiative.

Because of the growing interest in project management, the number of models and standards in this area is constantly increasing. This reflects a natural tendency to adjust more precisely to regional, national, industry and corporate governance needs.

As a result of the study of different methodologies and standards for the management and implementation of General-purpose projects, that is, used in various areas of production activity, two specialized extensions of PMBOK and ESUP for the construction area were considered.

A distinctive feature of specialized extensions is the accepted practices and features found in construction projects.

As for PMBOK, this extension is a very important development for this specialization, as it ensures the consistency of approaches around the world. In other words, the application of this development leads the management of construction projects to a single standard, a common language.

As a rule, these projects are independent from each other, and only in rare cases they form project programs (for example, projects for the development of microdistricts or industrial sites). In this regard, the task of Expanding the ESUP standard for the design of construction projects is to distinguish the areas of application of project and portfolio management.

From all the above it follows that the peculiarity of modern project management technologies is that these technologies work in all areas of applications, allowing to effectively implement projects, to ensure mutual understanding and interaction of project participants, high reliability of achieving goals. Basically project management helps to decide to justify the feasibility of investments, to develop an optimal scheme for financing works, supplies of materials and equipment.

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