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Assessment of the project management system in the context of the implementation of large–scale projects: approaches and indicators

A constant search for effective management tools becomes necessary against the background of economic globalization, growing competition, fast changing environmental factors, increasingly stringent product quality requirements. The project management methodology can boost management efficiency by focusing efforts on a specific area of activity and implementing the necessary strategic changes. As management problems become more complicated, the project management system itself undergoes changes and moves to a new level of organizational maturity, but the process of these changes cannot be considered complete. It is necessary to use performance indicators to boost the motivation of a project team.

The research shows that it is necessary to improve the tools used to assess in-house project management systems that rely on the international experience of using both the key indicators and expert assessments that entail a comparison with a certain reference state of the system. The system of indicators should have an integrated management framework designed in the format of a project-oriented structure.

The purpose of the article is to consider and generalize the approaches, goals and principles of a system of indicators for assessing project management in an organization and drafting a system of indicators. The co-authors take advantage of the provisions of the project management methodology and framework management models to develop a system of indicators used to assess project management processes and results. Their novelty stems from an approach to the systematization of indicators in the context of subject- and management-focused process groups, specified in the Russian project management standards with a focus on the function of control.

Keywords: *project management, system maturity characteristics, system structure, motivation and control, project management assessment indicators*

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1. PROBLEM RELEVANCE

It is necessary to take account of a long-term period, a large number of participants, their economic interests, functions, management regulations, and a large number of interrelated targets to develop a system for the performance evaluation of a team of large-scale project developers. Only well-organized project activities, project team's motivation to succeed, team consistency, and competence development can ensure the achievement of project goals.

A team motivation system, can supplement the current motivation system, designated for all employees of the company, and a project needs information support and a system of key performance indicators, both general, reflecting the functions and mechanisms of project management, and specific, reflecting the subject area of project changes.

In fact, it is necessary to create an information and analytical system to provide prompt hierarchical problem-focused access to reliable and relevant information presented in the form convenient for decision-making. A well-organized system correctly assesses achieved levels, timely adjusts management actions, and improves the efficiency of project teams.

Development of an integrated management framework for decision-making and information exchange is a complex though solvable task to be tacked using a unified model of processes, their standardization, horizontal and vertical integration. Conversion of unreasonably large amounts of "confidential" information into publicly available data will allow to manage projects more effectively by taking advantage of each strength of the project management methodology [1].

It is necessary to consider different approaches to the unified project management framework of an information and analytical system of project management. At the same time, it is necessary to comply with existing project activity regulations. In particular, the document titled "Fundamentals of professional knowledge and national requirements for the competence of project management specialists (NRC)" addresses the system model of project management, and its core element represents a folded tree that has a wide range of tasks and procedures representing the theoretical basis of project management. The model has three main blocks[1]: management objects, management subjects, and management processes.

Each block has a hierarchical structure, that correlates with the indicators characterizing project goals, project participants, their interests, and the organizational structure of project management.

It is necessary to identify the indicators that correspond to the levels of management associated with management subjects in compliance with the national requirements for the competence of specialists[1]:

• the strategic level encompasses the entire

1 Basics of professional knowledge and national requirements for the competence of project management specialists (STC). URL: https://pmpractice.ru/knowledgebase/normative/evaluation/ntk (date of access: July 2, 2021).

project life cycle; indicators characterize its implementation at each phase (goal achievement broken down by project milestones);

- project activities that are scheduled to be completed in the course of the year;
- project activities that are scheduled to be completed in the course of the quarter;
- the operational management level (shorter implementation periods).

According to articles 4–7 of the PMBOK guidelines, there are five object-processes, that are subject to evaluation, that can serve as the basis for key project performance indicators (KPIs)[2]:

1. Initiation encompasses development of the project implementation schedule, the budget, and technical support regulations. In the course of designing the KPI system, project developers determine scheduling quality indicators, deviations from the project schedule and budget, conditions of the resource-intensive and technical project support, as well as revisions of these parameters in the process of the project implementation. In particular, the co-authors propose to employ the following indicators to evaluate the project scheduling quality[3]:

- accumulated deviations due to rescheduling, in days;
- accumulated deviations due to rescheduling, as a percentage of the total project implementation period.

These indicators will not only demonstrate errors in project scheduling, they will also help to identify the faulty organization of management processes that will necessitate adjustments. The system does not take account of deviations, caused by the external environment and considered as factors of risk. Deviations must be measured in relation to their origin, including the accuracy of resource planning, poor work quality, and violation of agreement terms by suppliers.

2. Scheduling means compiling a detailed list of suppliers, contractors, formulating the need for and sources of human resources.

3. Performance means compliance with the schedule, the project budget, the quality of work and contractual performance.

4. Monitoring and control encompass the adjustment of processes, the evaluation of the work quality performance and budget expenditures.

5. The project completion allows to assess the comprehensiveness of the achievement of project objectives, the actual results of the economic, budgetary and social effectiveness of projects. At the project initiation stage, performance indicators are calculated; however, at the end of the project implementation period, values of indicators may differ from the projected ones and these discrepancies allow to make a conclusion about the success of the project.

Each project has specific, quantifiable indicators, whose values indicate the achievement of project goals. Long-term projects entail a staged change in the project scope accompanied by the attainment of the target indicators. In particular, the target indicator of national project “Safe and high-quality motor roads” represents the share of regional roads that meet regulatory requirements. In 2024, the value of this indicator is expected to reach 50.9 % (the base level is 43.1 %)[4]. Almost every project has a group of target indicators whose values are pre-set for each project year; hence, the performance is re-assessed each year.

A corporate project management system needs revisions due to ever developing economic relations, tightening competition, and other factors that make the function of management more complicated. Ongoing monitoring of the state of affairs allows to determine the level of the system maturity and outline its further development patterns. In this case, values of project management efficiency indicators will go up for each subsequent project.

The organizational maturity of project management is the ability of an organization to select projects and manage them in such a way that most effectively supports the achievement of corporate strategic goals.

In the course of studying project management tools, many authors arrived at the conclusion that a systematic independent assessment of project management maturity is as important as the evaluation of efficiency of each implemented project[3] [3–5]. The evaluation of the organizational maturity of project management allows to analyze the state of affairs at an organization, identify the opportunities for the implementation and development of project management techniques. The results of such an evaluation can serve as the source information for a tree of project management goals [5].

One of the first project management maturity evaluation models was developed by G. Kerzner; it has five levels of project management maturity [6]:

Level 1 — common language;
Level 2 — common process;
Level 3 — singular methodology;
Level 4 — benchmarking;
Level 5 — continuous improvement.

This approach has boosted the development of a project management system; it guides and inspires the emergence of other approaches to assessing project management maturity. Later, other approaches appeared, each having its own number and composition of levels.

Having analyzed various approaches to the maturity level of project management, the researchers came to the conclusion that the requirements applied to the maturity levels are most fully disclosed in the IPMA-SOVNET methodology [4], that has four clearly defined levels of project management maturity. Top level 4, or “Continuous improvement and benchmarking”, has the following characteristics:

- compliance with the best international practices;
- continuous adaptation of a comprehensive project management system to the best practices;
- massive basic training and career development events;
- the strategic role of the project office.

This level emphasizes the strategic role of the project office, as well as the impact of project management competencies on the in-house career advancement. The availability of the system of key performance indicators will facilitate the comprehensive attainment of these goals.

2 Guide to the Project Management Body of Knowledge (PMBOK Guide). URL: https://www.litres.ru/raznoe-4340152/rukovodstvo-k-svodu-znaniy-po-upravleniu-proektami-rukovods (date of access: June 2, 2021).

3 Malakhov V. Examples of KPIs for measuring the success of a project office. URL: https://www.advanta-group.ru/blog/primery-kpi-dla-proektnogo-ofisa/ (date of access: June 21, 2021). (rus.).

4 Passport of the national project “Safe and high-quality highways”. URL: https://bkdrf.ru/uploads/doc/%D0%BF%D0%B0%D1%81%D0%BF%D0%BE%D1%80%D1%82%20%D0%BD%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D0%BE%D0%B3%D0%BE%20%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%D0%B0.pdf (date of access: May 22, 2020).

2. APPROACHES TO KEY INDICATORS NEEDED TO ASSESS A PROJECT MANAGEMENT SYSTEM

The compilation of a system of indicators, that showcase the staff motivation, entails a set of sources, including the project management system, programs, and the project portfolio.

A slightly adapted balanced scorecard, developed by Norton and Kaplan, was applied in various areas of activities and converted into the system of key performance indicators (KPIs), also applied by project-oriented businesses. A project-oriented organization is an organization that chooses project management as an organizational strategy, that makes temporary teams or maintains permanent organizational structures designated for project management. The following advantages are emphasized in respect of the applicability and strengths of a balanced scorecard in a project-oriented organization [7]:

- the ability to optimize budgets;
- the transformation of strategic project goals into clear business unit objectives, having measurable targets and deadlines to be met by certain managers in charge;
- the focus of business units and divisions on strategic goals;
- the concentration of resources in an effort to solve strategic problems.

Research projects address (1) the project evaluation approach, taken by groups of people concerned with project results, (2) the consideration for and coordination of the interests of business owners, company managers, project initiators, and project office employees3. Along with other indicators, the co-authors propose to assess the project scheduling quality, that needs no adjustments in the process of the project implementation, if it is ideal, and that can be characterized by the following indicators in other cases[3]:

- accumulated deviations due to rescheduling, days;
- accumulated deviations due to rescheduling, as a percentage of the total project period.

This method does not take account of the deviations caused by the external environment, it merely considers the deviations related to project changes, which is not quite logical, since the idea is to analyze the project risks as a function of the project management. It is necessary to identify the causes of the failure to comply with the project schedule before measuring deviations caused by delays. The causes may include resource planning inaccuracies, poor project work quality, and violations of agreement terms by suppliers. A timely evaluation helps to improve the project management procedure.

Project management needs a system of performance indicators to motivate personnel to solve problems in the context of numerous limitations typical for project activities; the unique nature of projects is determined not only by the composition of tasks to be tackled, but also by motivation. This phenomenon stems from the scale of projects, the unique features of the subject area exposed to changes, the composition and interests of the project participants.

In particular, the following factors are recommended to be taken into account in the process of designing a project motivation system[5]:

- goals pursued by the project managers and the project team;
- interests of the company employees and independent participants;
- the period of activity of the motivation model;
- the list of KPIs and calculation procedures;
- penalty regulation and incentivization procedures;
- scheduled KPI calculations;
- motivation budget regulations.

The co-authors propose to focus on the three elements of the “triangle of restrictions” with a focus on the main management functions, objects, subjects, project stages, restrictions and risks[5]:

- budget constraints;
- time limits;
- project indicators.

The effectiveness of projects is largely determined by the skillful use of these three aspects, and it is these three aspects that should serve as the basis for the system of evaluation indicators. The earned value method (EVM) is proposed as the basis for the appropriate KPIs. The purpose of developing indicators for this group is to determine whether the actual amount of work performed corresponds to the planned amount within the budget[5]. In general, this approach is consistent with the essence of project management.

An integrated motivation system was developed on the basis of project-focused motivation principles for the benefit of project management at the national, federal and regional levels. The system can be integrated into practical corporate activities. Key performance indicators (KPIs) are structured as follows[6]:

- project KPIs determine the project implementation efficiency with regard for the attained results, and the same for all project team members;
- KPIs of the event block determine the efficiency of the block of interrelated activities, if the specific nature of the project requires its formation;
- an individual KPI reflects an individual efficiency of each project participant (in addition to the work quality and timeliness, team interaction efficiency is also taken into account).

Key performance indicators, that apply to projects and blocks of project activities, are most important for evaluating the work of the project director manager, while an individual key performance indicator is of maximal importance for project executors. An individual KPI is determined by the project manager. The problem is that the evaluation system must be based on accurate measurement methodologies and standardized requirements applicable to project competencies. If a biased approach dominates, the motivation of project office employees to develop competencies will go down [8].

It should be noted that the indicator of each level should be defined as an integrated value of the system of indicators that reflect the specific nature of the project scope and the responsibility of a particular executor.

In accordance with GOST R ISO 21500-2014[7], project management processes are divided pursuant to two characteristic features, including subject and management groups. Given this approach and the purpose of the study, we consider the subject groups of processes in relation to the management “control” group and offer the following indicators (Table).

5 Sultanov I.A. Using the KPI methodology in projects. URL: http://projectimo.ru/strategicheskoe-planirovanie/klyuchevye-pokazateli-ehffektivnosti-kpi.html (date accessed: July 2, 2021). (rus.).

6 Methodical recommendations for the implementation of project management in executive authorities. URL: https: //admlip.ru/doc/app/adm/dep_ecn/metod_2.pdf (date accessed: July 2, 2021).

7 GOST R ISO 21500-2014. Project Management Guide. URL: http://docs.cntd.ru/document/1200118020 (date of access: June 12, 2021).

Indicators of project motivation broken down by the subject groups of processes

Subject groups of processes	Meaningful interpretation from the standpoint of control	Indicators
Integration	Control over changes. Control over project activities	Target project indicators. Total actual deviation from target indicators. Actual deviation from target indicators due to specific reasons
Resources	Managing project resources	The number of violations of resource delivery schedules. Losses caused by schedule violations
Deadlines	Control over the project calendar plan	The number of violations of work performance deadlines that do not extend the project implementation period. The number of violations of work performance deadlines that extend the project implementation period. An increase in the work performance period as a percentage of the scheduled deadlines. The number of violations of work performance deadlines due to in-house reasons. The number of violations of work performance deadlines due to external reasons
Cost	Cost control	Project cost overrun, in monetary units. Project cost overrun, in %. Cost overrun by the types of work, in monetary units. Cost overrun by the types of work, in %
Risks	Risk management	The planned financial reserve of the project. The used financial reserve of the project
Quality	Quality control	The quality of individual events. The quality of a block of interrelated events
Purchases	Contract management	The percentage of contracts whose terms are violated

The quantitative efficiency assessment of corporate project activities should reflect not only the achievement of project goals in various contexts, but also the teamwork, that determines project success, including the staffing of the project team, the stability of the team composition at each phase of the team's life cycle; the loyalty of the project team; the responsiveness to project problems. It is difficult to use computational and economic indicators alone to characterize teamwork. Besides, an expert examination of project management is needed, a comparison with some benchmark characteristics of the system.

3. CONCLUSION

The current state of economic relations is characterized by high competition. This feature is equally typical for various sectors of the economy. Project management tools are highly efficient in project management if applied to maintaining or strengthening competitive positions. Effective project management means the availability of project management competencies among the staff, a motivation mechanism needed to achieve project goals, and the maturity of the corporate project management system. High maturity means a strong project focus of an organization, when special project offices are created for the attainment of strategic goals. These project offices have special authorities and perform integratory functions aimed at the implementation of a project or a portfolio of projects.

The research shows that the motivation mechanism of project management requires further development. In particular, this statement applies to the systems of indicators needed to evaluate the efficiency of project management. When compiling a system of indicators, a project manager should take account of project goals and the project management system as a whole, since this approach will arrange the conditions for boosting the project management maturity.

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Оценка системы проектного управления в условиях реализации крупномасштабных проектов: подходы и показатели

В условиях глобализации экономики, роста конкуренции, значительной динамики факторов внешней среды, возрастающих требований к качеству продукции необходим постоянный поиск эффективных инструментов управления. Применение методологии проектного управления способно обеспечить эффективное управление за счет концентрации усилий на развитие конкретного направления деятельности, обеспечить необходимые стратегические изменения. По мере усложнения управленческих задач сама система проектного управления претерпевает изменения, переходит на новый уровень организационной зрелости, однако процесс этих изменений нельзя считать завершенным. Необходимо совершенствование мотивационного механизма команды проекта на основе оценочных показателей деятельности.

Исследования показывают, что необходимо совершенствование инструментария оценки самих систем проектного управления в организации, опираясь на мировой опыт применения не только ключевых расчетных показателей оценки эффективности систем проектного управления, но и на экспертные оценки систем, предусматривающие сравнения с некоторым эталонным состоянием системы. Построение системы оценочных показателей должно базироваться на формировании единого управленческого контура в формате проектно-ориентированной структуры.

Целью статьи является рассмотрение и обобщение подходов, целей и принципов формирования системы показателей оценки проектного управления в организации, разработка предложений по развитию системы показателей. Базируясь на положениях методологии проектного управления, моделях формирования управленческого контура, авторы предлагают систему показателей для оценки результатов и процессов проектного управления. Их новизна определяется подходом к систематизации показателей в разрезе предметных и управленческих групп процесса, предусмотренных российскими стандартами управления проектами с ориентацией на функцию контроля.

Ключевые слова: *проектное управление, характеристики зрелости системы, структура системы, мотивация и контроль, показатели оценки проектного управления*

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