

**INFORMATION SYSTEMS
AND INNOVATIVE TECHNOLOGIES
IN PROJECT AND PROGRAM
MANAGEMENT**

**Collective monograph edited by
I. Linde, I. Chumachenko, V. Timofeyev**

ISMA University of Applied Science

Riga (Latvia) 2019

**INFORMĀCIJAS SISTĒMAS
UN INOVATĪVAS TEHNOLOĢIJAS
PROJEKTU UN PROGRAMMU
VADĪBĀ**

Kolektīvas monogrāfija

I. Linde, I. Chumachenko, V. Timofeyev

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The monograph presents the achievements of Ukrainian scientists on enterprise management, the use of economic and mathematical modeling, information technologies, management technologies and technical means in the field of enterprise functioning and development and project management at enterprises.

The publication is recommended for professionals in the fields of economics, information technology, project and program management - for undergraduate and graduate students, as well as academics and teachers of higher education.

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9. MANAGING TEAM PROJECTS IN TERMS OF ADAPTATION TO CHANGE REQUIREMENTS OF PROJECT STAKEHOLDERS

Husieva Yu. Yu., Chumachenko I. V.

Annotation

Successful implementation of projects, project portfolios and programs can be ensured, in particular, through the development of decision support information systems for the formation and management of responsive project teams. Based on the analysis of existing developments, we can conclude that the known methods of human resources management are oriented, for the most part, to the psychological compatibility of project team members, without taking into account the issues of competence management and resource allocation. At the same time, the project management methods of the team do not provide sufficient adaptability. With this in mind, the challenge of improving project performance through informed decision making while managing adaptive teams is relevant.

The tools of decision support for project management in the conditions of adaptation to changes in requirements of project stakeholders are offered. Thus, the required method enables monitoring of the project stakeholders' requirements, which in turn allows the project team to adapt to the likely changes in stakeholder requirements. The transition to value monitoring provides an opportunity to take into account the intangible requirements of the project team and other stakeholders. To distribute values, the project team proposes to use a balance model with recommendations for adhering to an equivalent exchange.

Introduction

In today's dynamic environment, one of the urgent tasks of project management is to adapt to changes, in particular, in the field of human resource management of projects and programs. Unstable economic environment reduced investment in project implementation in Ukraine and in the world, increased risks of late execution of projects with budget overruns, necessitates the use of modern project management tools. Human resource management is known to have a direct impact on the overall effectiveness of project management. Therefore, now that both staff mobility due to political changes and the level of human-related risks have increased significantly, developing a project management team with a view to its adaptability is becoming an urgent task.

The adaptability of the project to change is ensured by a variety of tools in traditional and flexible project management. Traditional project management [1] considers change management through an integrated change control process - a process that lasts throughout the

project and is to reject or approve requests for change, which are typically generated as outputs of monitoring and control processes. In fact, it is about documenting, not justifying change; control, not control. Therefore, the experience of traditional project management in managing change in managing an adaptive project team is inadequate. In addition, the complexity and cost of implementing change in the traditional approach has increased rapidly since the beginning of the project.

Flexible project management methodologies have a greater degree of adaptability due to their iterative nature, but are mostly used in the field of IT projects [2-4]. A characteristic feature of flexible methodologies is the fixation of project resources, that is, project adaptability to change is ensured by changes in project content (in traditional methodologies, content is fixed). Because the project team refers to its resources, therefore, it is fixed, its adaptability for the most part, manifests itself in the distribution of tasks between team members. For complex projects with various resource constraints, the possibilities of this approach are insufficient.

Common methods of forming and managing a project team in both traditional and flexible methodologies are methods of general theory of personnel management and its development in the form of human resource management - organizational management, management psychology, leadership, motivation, combination of personnel management strategy with the strategy of the company [5, 6]. The disadvantage of this approach is its focus on operational rather than project activity.

Competent approach in project management (in particular, ICB 4.0) defines the competencies that the project manager should possess, but does not make recommendations for the formation of the project team. It should be noted that domestic studies are carried out in similar directions. Adaptation of a competent approach to the modern realities of national project management [7] and development in the field of value project management, which propose to form a project team taking into account the comparison of values of members of the project team and the project, should be mentioned separately. [8].

Therefore, there is a need to develop methods for forming and managing an adaptive project team that combine the features of traditional and flexible methodologies, given the limited resources of the project.

Based on the analysis of the state of the existing developments, it can be concluded that the known methods of human resources management are focused on the psychological compatibility of the project team members, without taking into account the issues of

competence management and resource allocation by function. At the same time, the project management methods of the team do not provide sufficient adaptability.

As human resources in the project may change, there is a need for a reallocation of project resources at the operational stage. Existing resource allocation methods are mainly aimed at allocating homogeneous (by function) resources and taking into account the speed of function execution. The application of these methods to heterogeneous projects is inappropriate. With this in mind, the challenge of improving project performance through informed decision making while managing adaptive teams is relevant.

Adaptability as a specific feature of modern project management. Means to adapt the team to changes in stakeholder requirements

Any projects are accompanied by changes in both the internal and external environment. Adequate and timely response to such changes is the key to "surviving" the project.

Today, the most adaptable to adaptation are the so-called "flexible" project management methodologies. In 2001, Agile Manifesto declared such values: «Individuals and interactions over processes and tools. Working software over comprehensive documentation. Customer collaboration over contract negotiation. Responding to change over following a plan. That is, while there is value in the items on the right, we value the items on the left more. ».

Agile is best suited to non-deterministic projects for which the final configuration of the product or service being developed is not known at the start of the project and is formed as a result of successive iterations. Examples of such projects may be research or IT projects. Agile is proven to work well for small projects. However, implementing of Agile for large projects is more problematic [9].

The need to take into account the adaptability factor is also recognized by a representative of traditional project management as PMI (Project Management Institute), which in September 2017 issues the sixth edition of the Project Management Body of Knowledge (PMBOK® Guide), each area of knowledge containing a section called Approaches for Agile, Iterative and Adaptive Environments, which describes how these practices are integrated into project management processes. At the same time, a standard in the related industry - A Guide to The Business Analysis Body of Knowledge - received this addition in 2013.

Taken into account that standards such as the PMBOK® Guide only provide guidance on the use of certain methods, without detailing them and specifying how to adapt to a particular industry, it can be argued that the task of integrating adaptive management practices

into traditional project management is relevant, but to date it has no clear practical implication.

Adaptation is a fundamental property of matter, organization and man. Adaptation provides an intelligent approach to problem solving, emphasizing the need for development through interaction, response, adjustment, feedback, and recognition of the complexity and uncertainty of the environment.

Adaptation is considered in several areas:

- biology (adaptation of the organism to external conditions in the process of evolution, including morphophysiological and behavioral components);
- sociology (the process of interaction of an individual or group with the social environment, when an individual assimilates social norms and traditions of subcultural values of a certain group);
- control theory (uses the concept of an adaptive system as a control system that has the ability to change the parameters of the regulator or the structure of the regulator depending on changes in the parameters of the control object or external changes), in particular, in such its applications as education management, enterprise and coordination of its operational and project activities.

APM (Association for Project Management) specialists consider adaptation within three interrelated streams [10]:

- elasticity – recovery, ability to absorb changes and breakdowns, deal with unexpected future;
- flexibility-a variety of potential solutions and options, the ability to respond quickly and change the strategy in response to emerging trends and events;
- evolution is the process of interaction with the environment, relevant changes and responses; potential for innovation; emphasis on continuous improvement.

From a systemic approach point of view, adaptation is the process of changing the parameters and structure of a system, in particular, the control effects, based on current information, with the aim of achieving a certain, usually optimal, state of the system at initial uncertainty in the operating conditions [11].

A system that can adapt to changes in internal and external conditions is considered adaptive.

The project team must adapt in a timely manner to changes in project stakeholders' requirements. In [12-14], an approach is proposed that allows monitoring and controlling the implementation of project stakeholders. The results of relevant research are a tool to support

decisions on managing an adaptive team. Thus, the indicators of the method of the developed volume of requirements of project stakeholders were determined:

PR – the planned volume of requirements (in monetary form), which according to the plan must be completed at the time of the report on the volume of development;

ER – the actual volume of requirements (in monetary form) that is really executed at the time of the report on the mastered volume;

AC – the actual amount of resources (in monetary form) that is spent on the implementation of the project at the time of the report on the volume of development;

SR – deviations in the compliance schedule:

$$SR = ER - PR .$$

CR – deviations in meeting cost requirements:

$$CR = ER - AC .$$

SPIR – index of meeting the requirements of stakeholders according to the schedule:

$$SPIR = \frac{ER}{PR} .$$

CPIR – index of fulfillment of stakeholders ' requirements by cost:

$$CPIR = \frac{ER}{AC} .$$

Thus, there are several areas within which the project can be carried out at the time of the report on the completed volume:

- fulfillment of requirements is carried out in accordance with the plan by terms and budget. Ideal condition in which the variance in terms of time and cost is zero and the corresponding indices are in units;

- one of the planned indicators - either the budget or the deadline, is executed according to the plan, the corresponding deviation is zero, the index is one;

- the implementation of the project on both indicators (budget and timing) is not planned, but the deviation for one of them is positive, i.e. there is a budget saving or ahead of requirements.

- the implementation of the project on both indicators (budget and timing) is not planned, deviation for both - positive, i.e. there is a budget savings and ahead of requirements.

- the implementation of the project on both indicators (budget and timing) is not planned, deviation for both - negative, that is, there is an excess of budget and lag in the fulfillment of requirements.

There are two ways to forecast stakeholder compliance in the future. The first method is non-adaptive, though it allows you to change the original duration and cost estimates included in the baseline plans if new information indicates that the initial estimates are incorrect:

$$EAC(R) = \frac{BAC}{CPIR},$$

where EAC (R) - estimate requirements at completion, estimate of project budget completed on the basis of data known at the time of the report on the volume completed; BAC - the budget on completion, the cost of meeting all project requirements. The EAC (R), calculated at each time point, shows what the final cost of the project will be if the project stakeholders still continue to meet the same level of performance as before, i.e.,

$$EAC(R) = AC + residual \frac{PR}{CPIR}.$$

This is a pessimistic assessment; because it is based on the assumption that further implementation of the project (during the implementation of stakeholder requirements) will make mistakes that have already occurred in the part of the project that has already been implemented.

In a more optimistic (adaptive) approach, if it is assumed that from the date of the report on the completed project requirements the work of the team will be adjusted and the project will be implemented in accordance with the plan, the value of EAC (R) is calculated as the AC up to the current date (actual costs at the current date) that can no longer be modified, plus the amount of work that needs to be done based on the basic requirements plan. That is,

$$EAC(R) = AC + residualPR,$$

$$EAC(R) = AC + BAC - ER.$$

An even more optimistic view can be offered, which provides an opportunity to not only improve project compliance from now on, but also to offset budget overruns by the time the project is completed. Adjustments of this nature make sense to use in small projects.

Balance of value in adaptive project management

A more general approach to monitoring project stakeholder compliance may involve tracking not just the list of requirements but achieving some value for each stakeholder.

Thus, the EVM Scoped Method allows you to track the progress of a project in terms of completing its work on time and within budget; the ERM Requirements Method combines specific requirements with project work and enables monitoring of compliance with requirements, which in turn allows the project team to adapt to likely changes in stakeholder requirements. The transition to value monitoring provides an opportunity to take into account intangible requirements, which is especially important for managing a project team that has its own requirements, but the project clearly only includes a "technical" component that is directly related to the execution of project robots and is relevant, for example, to the required hardware, software, communications, etc.

The theoretical basis for such an approach (in determining value) may be, for example, the P2M standard (in terms of which a project is a mission-based value creation exercise within an agreed upon time frame and constraints in the form of resources and external circumstances) or the GPM Global P5 Sustainable Project Standard (which provides a list of design characteristics to evaluate in terms of sustainability, Figure 1). The latter standard has a unit for evaluating, in particular, project management policies regarding personnel practices, recruitment and staffing procedures, employee attitudes and well-being, which may be useful in this study.

The achievement of the project's planned value is tracked through a series of indicators:

PVal – the planned project value to be achieved at the time of the report;

EVal – the actual value of the project actually achieved at the time of the report;

SVal – deviation in the achievement of the scheduled value:

$$SVal = EVal - PVal .$$

SPIVal – the index of achievement values on schedule:

$$SPIVal = \frac{EVal}{PVal} .$$

If the value of the project as a whole (or for the individual stakeholder) can be determined in monetary terms, then the deviation and the value achievement index can be calculated.

It should be noted that for the effective work of the team the achieved team value should not be reduced during the execution of a specific project. In this case, the redistribution of values within the team can be modeled on the balance sheet.

Project											
Product Impacts Objectives & Efforts Lifespan & Servicing					Process Impacts Maturity and Efficiency						
Society (People)					Environmental (Planet)					Economic (Profit)	
Labor Practices & Decent Work	Society and Customers	Human Rights	Ethical Behavior	Transport	Energy	Water	Waste	Materials and Procurement	Return on Investment	Business/Agility	Economic Stimulation
Employment Labor/Management Relations Health and Safety Training and Education Organizational Learning Diversity and Equal Opportunity Trained Professional Emigration	Community Support Job/Unemployment Public Policy/Compliance Customer Health and Safety Market Communications and Advertising Customer Privacy Cultural Impact	Non-Discrimination Freedom of Association Child Labor Forced or Compulsory Labor	Investment and Procurement Practices Bribery and Corruption Anti-Competitive Behavior	Digital Communication Traveling Transport	Energy Used Clean Energy Return Renewable Energy	Water Quality Water Consumption Water Displacement	Recycling Practices End of life disposal/reusability Waste Disposal Co2 emissions Air Quality Noise Pollution Good Neighbor	Materials used by weight or volume Recycled Input Materials Sustainable Procurement Practices	Benefit Cost Ratio Direct Financial Benefits Sustainable Return on Investment Net Present Value	Flexibility/Optionality in the project Increased Business Flexibility	Local Economic Impact Sustainable Profitability/Indirect Benefits

Fig. 1. Matrix GPM P5

The model of balance relations proceeds from [15-17] that the project stakeholders (in particular, the team) enter into relations with each other solely for the purpose of resource exchange. Relationships between objects can be of three types: asymmetric (in favor of the target element or to the detriment of the target element) and equivalent (Fig. 2, Table 1). An equivalent exchange is a state that the system seeks. It provides a balance of the system which, in the absence of external influences, is stable. In this case, asymmetry in favor of the target element can be considered as a positive phenomenon only in the short term. In the long run, the counterparty will seek to strike a balance or break the relationship.

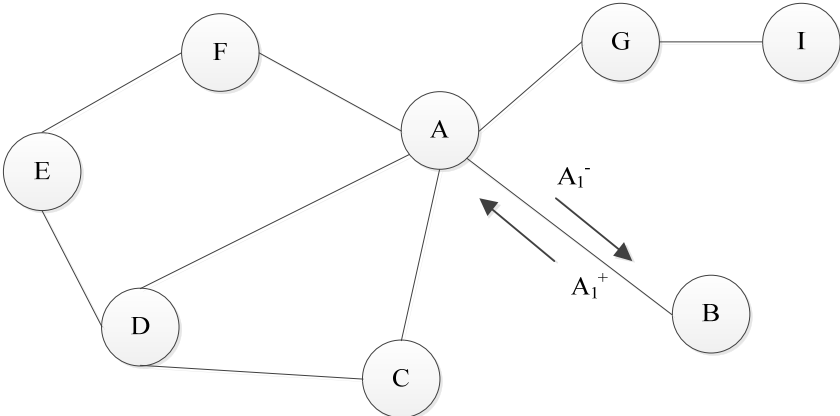


Fig. 2 – Balance sheet model of stakeholder relationships

Table 1 – Description of the stakeholder relationship system using the balance sheet model

Characteristics of the target element	Characteristics of the non-target element	Relationships description	Balance equation
The target element has a relationship with other elements	Non-target elements are unrelated (direct or through other elements)	The network is divided into separate subnets, which consist of two elements, one of which is the target.	$\sum_i A_i^+ \geq \sum_i A_i^-$
	Non-target elements have links with each other	There is a possibility of compensated imbalance, when unbalanced relations between some elements are compensated by unbalance with other elements	

The opposite is possible only when the resource estimates are different for different stakeholders. That is, the asymmetry in favor of the target element can be positive for its counterparty. The balance equation for bilateral relations is formulated as follows: $A^+ \geq A^-$

Therefore, the distribution of values within a team over the long term should be equivalent and taking into account individual estimates of resources different for different team members.

Conclusions

In order to maintain the competitiveness and investment attractiveness of projects and programs in the current economic environment of Ukraine, it is advisable to improve the methods of personnel management as a universal resource inherent in projects and programs in all sectors. It is important both to improve the known concepts, theories, methods and approaches, and to develop new methods to support change management decision-making when forming an adaptive project team.

It is advisable to carry out the corresponding developments with the combination of traditional project management means and "flexible" methodologies, which will allow implementing the advantages of both methodologies and methods of classical human resource management.

The instruments of decision support for project management in the conditions of adaptation to changes in requirements of project stakeholders are offered. Thus, the required method enables monitoring of the project stakeholders' requirements, which in turn allows the project team to adapt to the likely changes in stakeholder requirements. The transition to value monitoring provides an opportunity to take into account the intangible requirements of the project team and other stakeholders. To distribute values, the project team proposes to use a balance model with recommendations for adhering to an equivalent exchange.

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UN INOVATĪVAS TEHNOLOĢIJAS
PROJEKTU UN PROGRAMMU VADĪBĀ**

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20,3 uzsk.izd.l Metiens 300 eks. Pasūt. №. 132.
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