

JEL M50

DEVELOPMENT OF THE PROJECT STRUCTURE MODEL BASED ON THE ANALYSIS OF STANDARDS IN THE PROJECT MANAGEMENT FIELD AND THE TEAM ROLES THEORIES

POTSULIN ANTON (ORCID 0000-0003-1083-5442)¹,
 LOGINOVA ALEKSANDRA (ORCID 0000-0002-7783-7795)²

¹Far Eastern Federal University,

²Peter the Great St.Petersburg Polytechnic University

Abstract. The article is devoted to analysis of the approaches to designing of small working groups (project teams) structures. The work is based on the modern standards in the project management field related to the roles of project participants and their competences. For project team structure building a flexible model based on the criteria of heterogeneity of professional and social skills of the project members was offered.

Keywords: project management, project team, competence, team roles, standard.

INTRODUCTION

At present elements of project management structures can be found in many organizations. Project structures in the classical sense are distinguished by the fact that they are created on a temporary basis and an important role in such structures is played by horizontal connections between the executors. Among the reasons that contribute to the development of structures of this type are the complexity of information flows within enterprises, active involvement of information technologies in management processes and in main activities, increasing of small groups autonomy in organizations. In nowadays, such autonomy in decision-making is often used as a complementary factor for motivation of employees. Among the areas of activity, which are particularly characterized by the structure of the project type, are: development and implementation of information systems and technologies, consulting, architecture and construction, advertising and marketing, etc.

The *project team*, as it was observed in [1], is a group of professionals, working together on implementing a set of interrelated tasks aimed at achieving common unique targets in a given time frame.

Project management issues, including the task of selecting and implementing the

structure of the project, are the subject of discipline of project management. Project management methods take into account the innovative nature of the project work, high uncertainty, technical and organizational complexity of project activities.

REVIEW OF PROJECT MANAGEMENT STANDARDS

In the field of project management international standardized methodologies and national standards have been developed.

Modern global project management is based on three key documents:

1. PMBOK 6th Edition is a framework, a Guide to the project management body of knowledge (PMBOK Guide), which includes the standard, as well as a set of knowledge, traditional and innovative practices of project management.

2. ISO 21500:2012 is the first in the planned by the International Organization for Standardization (ISO) family of project management standards; it is designed to comply with relevant international standards such as ISO 10006-2017, ISO 10007-2017, ISO 31000-2018. The standard provides General guidance on project management processes that are of particular importance and affect the achievement of project results.

3. PRINCE2 is the fifth version of the standard issued by the British Chambers of Commerce, which is a part of the Efficiency and Reform Group. The standard is divided into two parts: Managing Successful Projects Using PRINCE2 and Directing Successful Projects Using PRINCE2.

IPMA ICB 4.0, a set of the requirements in the field of project management, is also used in project management.

The Russian regulatory framework in the field of project management is only being formed nowadays. Currently, it is represented by the following documents: GOST R (Russian: ГОСТ Р) 54869-2011 Project management. Requirements for project management; GOST R (Russian: ГОСТ Р) 54870-2011 Project management. Project portfolio management requirements; GOST R (Russian: ГОСТ Р) 54871-2011 Project management. Requirements for the management of the program; GOST R (Russian: ГОСТ Р) 53892-2010 Guidelines for assessing the competence of project managers. Areas of competence and criteria for professional compliance; GOST R (Russian: ГОСТ Р) 52807-2007 Management of competence assessment of project managers; the set of standards GOST R (Russian: ГОСТ Р) 56715-2015 Project management; GOST R IEC (Russian: ГОСТ Р МЭК) 61160-2015 Project management. Documentary analysis of the project; GOST (Russian: ГОСТ) ISO 21500-2014 Guide to project management, and a number of others.

ANALYSIS OF FEATURES OF PROJECT STRUCTURES AND LIMITATIONS OF STANDARDS

The listed international and Russian standards do not always pay enough attention to the issues of project personnel management and project structures development. Among the examples of early methods and standards of project management, which considered the models of project groups, can be noted: the "White Plan" method (USA, 1970s, developed in parallel with the standard MRP - Material Requirements Planning); the standard P2M (Japan); the technique of the Microsoft Corporation - Microsoft Solution

Framework, including a description of the model the project team - Microsoft Solution Framework Team Model (USA, 1994) [1, 2, 3]; the theory of team roles developed by Meredith R. Belbin and the related technique for definition of a role structure of a project group [8].

When developing a project structure, its flexibility is becoming a very important requirement, i.e. the ability of a structure to adapt to changes in the external and internal environment. As a rule, the flexibility of the structure is achieved by strengthening the horizontal links and the implementation of the principle of heterogeneity of the project group. It should be noted that project teams are small in most cases (up to 15-20 persons), because weak standardization and unification in project management, following from the very nature of projects, do not allow to make working units large. The participants of the project have a high degree of independence in conducting professional activities [eg., 4, pp. 126-133; 5, 6, 7].

The principle of heterogeneity indicates, first of all, that with relatively small size of project teams, however, highly qualified specialists from different fields of knowledge should be represented in them. Some of the modern standards for describing the skills required by the project participants operate on the concept of "competence" (see Table 1). However, the requirement of heterogeneity also applies to the socio-psychological skills of project participants, including leadership skills. Often there are recommendations for the formation of project teams, which focus on the functions of management ("roles"). In accordance with these approaches, in the list of project participants are included: Project Manager, Project Administrator, Controller, Coordinator, Project Forwarder, etc.

ELEMENTS OF PROJECT STRUCTURES IN THE STANDARDS: A COMPARATIVE ANALYSIS

Table 1 presents the results of a comparative analysis of the main international standards of project management, taking into account the following features of the classification:

1. The presence of a description of the roles in the project: a) the requirements for competencies for a separate project role are established; b) the recommendations on competencies are given in general, without reference to a specific role. 2. The use of the concept of a “competence” and its interpretation. 3. Details of competences presented in the standard. 4. The structure of the organizational model. 5. The scale of distribution of the standard.

Table 1

Characteristics of the main project management standards

Classification feature	Basic standards (recommendations) in the field of project management			
	PMBOK® 6th Edition Guide	ISO 21500:2012	PRINCE2®	IPMA ICB 4.0
1. A role description in the project	four main roles are highlighted: - project manager; - resource manager; - product manager; - project team	three main roles are highlighted: - project manager; - project management team; - project team	at least four roles	at least three roles
2. Use of the concept of “competence”	skills and capabilities required to perform assigned activities within project constraints	no definition	no definition	применение знаний, навыков и умений с целью достижения желаемых результатов
3. Detailed description of competencies	more than 30 competencies have been identified, recommendations for determining the level of ownership of each of the competencies are given	provides general recommendations on the structure of competences	provides general recommendations on the structure of competences	more than 30 competencies and recommendations for determination of the level of ownership of each of the competencies are given
4. The design of the model	three-level	three-level	linear	four-level
5. The scale of the distribution	national / international standard	international standard	state standard	international requirement

Source:[12, 13]

Table 1 shows that the standards of project management, having a number of differences, adopt a certain amount of knowledge from each other. In the Russian Federation, as a part of the standardization of project activities the national standard GOST R (Russian: ГОСТ Р) 21500:2014 identical to ISO 2500:2012 is used, despite the fact that the international prototype is in the last stage of revision and will soon be replaced by ISO/AWI 21500 “Project, Programme and Portfolio Management – Context and Concepts”.

Table. 2 shows those of the Russian standards, which consider the elements of project structures (competence and roles).

From the data in the Table 2 it can be concluded that the three present national standards define the competencies required by the project participants. Thus, only in one of these standards, namely in GOST R IEC 61160-2015 (Russian: ГОСТ Р МЭК 61160-2015), behavioural competence, regarding the Director and the Secretary of the group of analysis of the project, were defined. In the other standards only the professional competences were noted.

THE IDEA OF A PROJECT STRUCTURE MODEL

On the basis of the analysis carried out by the authors it was proposed to build the model of a project structure based on the role theory and, in particular, on the theory of M. Belbin's team roles, which has become widespread in the world practice of management [8, 9].

In addition, the requirement to provide a heterogeneous structure of the project team, on two grounds – professional and socio-psychological, was taken into account.

The examples of constructions of such models have been presented in the previous works of the authors of the paper [10, 11, 12]. The main features of these models

are: an interactive process of construction (the model is built step by step, at each step it is being specified); the evaluation of professional and socio-psychological skills of project participants on the base of the methods of organization of complex examinations, primarily the methods in which the information assessment of A.A. Denisov is used:

$$H_{ij} = -q_{ij} \log(1 - p_{ij}'),$$

where H_{ij} is the assessment of the significance of the i -th participant of the project from the point of view of the implementation of the j -th role (perform j -th function or operation), taking into account the evaluation q_{ij} made by the manager (the head) and self-esteem of the employee p_{ij}' ($0 \leq q_{ij} \leq 1$; $0 \leq p_{ij}' \leq 1$).

Table 2

Russian standards in the field of project management

Classification feature	The main national standards in the field of project management					
	GOST R 54869-2011	GOST R 54870-2011	GOST R 54871-2011	GOST R 53892-2010	GOST R 52807-2007	GOST R IEC (Russian: ГОСТ Р МЭК) 61160-2015
Number of roles in the project	4	3	4	M*	M*	from 4 and more
Number of competences	-	-	-	7	7	more than 3
«M*» - regarding Project Manager; «-» - competences are not identified (no data)						

Source: GOST R (Russian: ГОСТ Р) 54869-2011, GOST R (Russian: ГОСТ Р) 54870-2011, etc.

CONCLUSION

The article presents the results of the analysis of the provisions of project management standards in terms of recommendations for the formation of project teams. The idea of building a model of the project structure based on the theory of group roles is described. The model takes into account the professional and personal

characteristics of the project participants; the model based on the information approach of A.A. Denisov is given.

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