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ПРИМЕНЕНИЕ МЕХАНИЗМА КОМПЛЕКСНОГО ОЦЕНИВАНИЯ К РЕШЕНИЮ ЗАДАЧИ ОТБОРА ПРОЕКТА

Описывается модель сложной организационной системы управления, в рамках которой одновременно реализуется несколько подходов: функциональный, процессный и проектный. Обосновывается актуальность применения механизмов комплексного оценивания к задачам управления в организационных системах, в частности к решению задач согласованного принятия решений. Описываются причины несогласованности интересов в процессе принятия решений. Приводятся примеры задач управления в организационных системах. Детально рассматривается пример решения задачи отбора проектов в портфель с помощью механизма комплексного оценивания. Приводится совокупность критериев оценки и описываются матрицы свертки, которые получаются в результате парных сравнений показателей. Предлагается дальнейший план развития механизма оценки проекта по трем уровням, включая оценку рисков, с учетом ранга эксперта.

Ключевые слова: организационная система, матричная структура, согласование интересов, бизнес-процессы, проекты, задача многокритериального выбора, критерии отбора проекта, дерево критериев, матричные свертки, механизм комплексного оценивания.

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THE INTEGRATED RATING MECHANISM APPLICATION TO THE DECISION OF THE PROJECT SELECTION PROBLEM

The article describes the model of a complex organizational management system where the several approaches are simultaneously implementing: functional, process and design. The relevance of applying integrated assessment mechanisms to management tasks in organizational systems, in particular, to solving the problems of coordinated decision-making, is substantiated. The reasons for the inconsistency of interests in the decision-making process are described. Examples of management tasks in organizational systems are given. The example of solving the problem of selecting projects into a portfolio using the integrated assessment mechanism is considered in detail. A set of evaluation criteria is given and convolution matrices are described. The development plan for the project assessment mechanism including risk assessment, taking into account the rank of expert is proposed.

Keywords: organizational system, matrix structure, coordination of interests, business-processes, projects, multicriteria decision making, project selection criteria, tree of criteria, matrix convolutions, rating and control mechanism.

Introduction

Due to the continuous change in the external environment and high uncertainty, real business needs a decision-making tool that satisfies several conditions: flexible, fast in calculations, understandable to the user and multi-factor. To make a decision is to choose one from many alternatives. To make a choice, you must evaluate each alternative. The different rating and control mechanisms cope for this task.

Currently, most of the procedures at the lower levels of management are subject to automation; at this level, the machine can make a decision. However, complex decisions beyond the limits of one function department made by a person or even a group of interested persons. Thus, decision-making in the organizational system involves the need to coordinate the interests of the interacting parties [1]. Especially, this applies to companies with a complex matrix structure, high-tech production. Such companies has the complex processes that are not standardized and constantly changing.

An Example of the Practical Application of the Matrix Mechanism to Control Problems

Consider the organizational system where the functional structure officially operates, process approach is introduced and project activities are carried out in parallel (Fig. 1). In this case, the organizational structure has a matrix form. The matrix structure is characterized by double subordination. At the intersections of structures, problems of coordination of interests arise.

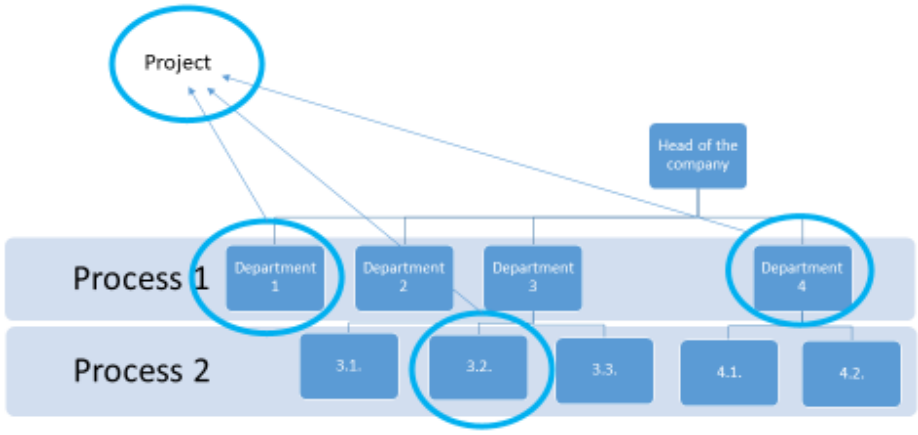

Fig. 1. Organizational structure model

Coordination of interests in structures of this type falls between representatives of several roles: the owner of the process, the head of the functional unit (department), and the project manager. They are the decision makers (decision makers).

Table 1 shows the examples of management tasks that arise during the interactions of various roles in the organizational system.

Table 1

Examples of practical control problems in complex matrix structures

No	Management task	Brief
1	Decision-making on project implementation	The task is to conduct an assessment of activities on the subject of "design", allows you to choose activities that are effectively implemented within the project. The question is being solved: “what is the project?”
2	Project portfolio performance Assessment	The task is to evaluate the effectiveness of both a single project and the project portfolio as a whole. It is necessary to determine the evaluation indicators, establish the priority of projects
3	Process evaluation	The solution of the problem should be based on evaluating the effectiveness of a single function performed in the process. If the organization has functional and a process structure at the same time, then the process will often performed by specialists from various functional units, which leaves its mark on the execution of the process
4	Assessment of the degree of implementation of methodologies (Lean, QRM, ISO, etc.)	The solution to the problem is achieved by developing a questionnaire, conducting a survey, and convolving estimates into a comprehensive indicator
5	Assessment of the effectiveness of the organizational system as a whole	It consists in developing a system of indicators that assesses the management system as a whole, how well it is agreed and effective.
6	Staff assessment	In the framework of the competency-based approach, it is necessary to determine the matrix of competencies, then evaluate each person on the basis of the selected criteria.
7	Risk-management	Identification, analysis and assessment of risks, etc. Requires coordination of interests of interested parties

These tasks can be solved using rating and control mechanisms. As an example, consider the first task from table 1, because the participant decision-making problem for any high technology companies such as Perm Scientific-Industrial Instrument Making Company is research and development (R&D) project selection.

This problem investigates by some authors, for example [2–5], there are discusses the list of criteria, their importance, methods and approaches allowing to make into account all the criteria in the complex when choosing R&D project. For example, the papers [3, 4] proposes to use analytic hierarchy process. However, some papers, for example, [6–7] shows, that applying the analytic hierarchy process may lead to mistaken conclusions. If the value of R&D projects will be consider, then the other methods must be applied to solve the problem.

The paper [8] investigates the effectiveness the application of methods of the theory of the criteria importance in hierarchical problems of multicriteria decision making. Speaking about hierarchical methods for solving multi-criteria decision-making problems, the well-know methods – matrix rating and control mechanisms should be mentioned. A description of these mechanisms is not gives in this paper; they can be found in other article [9–16].

The matrix rating and control mechanisms make possible to take into account the opinions of few agents [15] and coordinate their interests.

Moreover known several programs are called “Dekon” [11, 12] cope for application this methods and mechanism in different fields and scope. With the participation of the author was developed special module in the program “Research of Dynamic Systems” [16].

All said above determined the choice of methods applicable for solving the R&D project selection problem in favor of matrix rating mechanisms. In this paper will be shown set of criteria for R&D project selection, hierarchy tree of criteria and set of convolution matrices. They ones together are defining integrated rating mechanism for the project selection.

Fig. 2 shows the criteria that were selected by a group of experts in the first stage. The experts were consisted of the heads of company departments. The purpose of the first stage is to decide whether any activity is a project. There are three possible solutions: an activity is executed as a project (P), an activity can be issued as a project (IBE), an activity is not a project (NP).

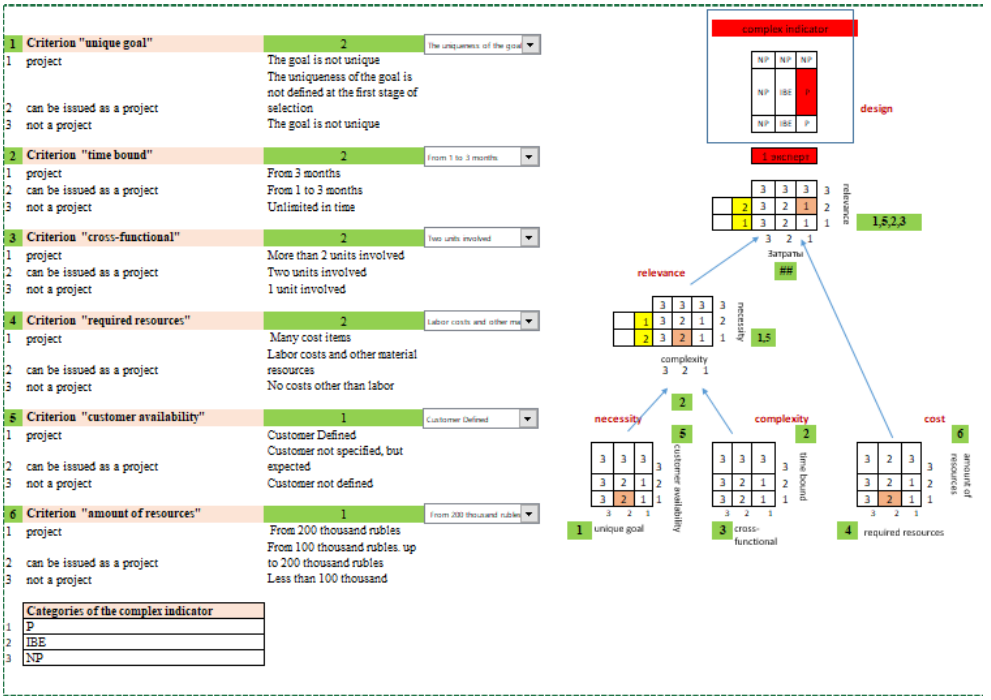

Fig. 2. The matrix mechanism of integrated project evaluation

The criteria tree is formed by six indicators that are involved in pairwise comparisons: “unique goal”, “time bound”, “cross-functional”, “required resources”, “customer availability”, “amount of resources”. The indicators “unique goal” and “customer availability”, “cross-functional” and “time bound”, “required resources” and “amount of resources” are compared among themselves. Each indicator is assigned values from 1 to 3 (Table 2), which forms matrices of the corresponding dimension, 3x3 (see Fig. 2).

Table 2

Project Evaluation Criteria

No	Criteria	Values
1	The existence of unique purpose	1- The goal is not unique 2- The uniqueness of the goal is not defined at the first stage of selection 3- The goal is not unique
2	Time bound	1- From 3 months 2- From 1 to 3 months 3- Unlimited in time
3	Cross-functional	1- More than 2 units involved 2- Two units involved 3- 1 unit involved

End of Table 2

No	Criteria	Values
4	Required resources	1- Many cost items 2- Labor costs and other material resources 3- No costs other than labor
5	Customer availability	1- Customer Defined 2- Customer not specified, but expected 3- Customer not defined
6	Amount of resources	1- From 200 thousand rubles. 2- From 100 thousand rubles up to 200 thousand rubles. 3- Less than 100 thousand rubles.

Based on Table 2, a pairwise comparison is carried out. Then convolution matrices are calculated, which ultimately gives a comprehensive assessment of the activity.

Conclusion

Thus, the use of the matrix mechanisms for integrated assessment allows us to solve a number of important practical problems. The example of integrated project evaluation, presented in this article, proves the applicability of the mechanism to real tasks. The evaluation mechanism can be used in other companies, since the criteria are multipurpose, they allow you to separate the project from the process. It is necessary to adapt the values in the convolution matrices to use this mechanism. A comprehensive assessment allows to managers make a decision about the starting of a project.

The next stages of investigation:

– description of the mechanism for the formation and evaluation of the project portfolio based on the matrix mechanism of integrated assessment;

– development of a comprehensive project risk assessment mechanism;

– development of a mechanism for calculating the motivation of project participants based on a comprehensive assessment of project effectiveness.

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