Algorithm for Experts' Competence Actualization Based on Joint Task Performing Results

Mikhail Petrov

ITMO University
Saint Petersburg, Russia
mikhail.petrov@iias.spb.su

Abstract—**The influence of experts' competences to project implementation success has been well studied in recent years and is used in expert networks. However, the impact of project implementation on competencies is currently a promising area. This paper presents an algorithm for competencies actualization, using project performing results to change the experts' competencies. This algorithm allows to take into account the mutual influence of competences and results on each other.**

I. INTRODUCTION

Management of expert competencies has a large role in modern organizations. It provides a clear understanding of the areas in which the organization and its employees are competent. A company can navigate in an ever-changing market due to competent project management and resource allocation. The competencies of experts change over time, in particular during the course of work on a project. However, this fact is rarely taken into account when analyzing their impact on project results. So, competencies are considered as an indicator that does not change or rarely changes.

Assignment of a project team to a job can lead to successful or unsuccessful results.. If the competencies of the experts in the team correspond to the required ones, then the probability of a successful result increases. In this case, the participants' competencies improve after the project completion. On the other hand, if the competencies are lower than claimed, the result will be less successful. Thus, project results analysis allows to adjust its participants' competencies.

During this work, definitions from [1] are used. According to the document, 'skill' is defined as the ability to apply knowledge and use know-how to complete tasks and solve problems. 'Competence' means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. 'Skill or competence level' is defined as a function of the complexity and range of tasks and duties to be performed in an occupation.

An analysis of the work in the field of competency management shows that the relationships between the project results and the competencies of the participants are well studied [2-6]. On the other hand, an analysis that considers these relationships to actualize the experts' competencies is currently a promising area of research. This paper presents an algorithm for actualization human resources. It allows analyzing the

relationship between the project results and the participants' competencies, as well as proposing relevant competencies changes.

This article is an extension of work on the competency management systems [7-10] and method of expert group formation for task performing [11], [12].

II. HUMAN RESOURCES COMPETENCE ACTUALIZATION

The description of the competence actualization algorithm is shown in Fig. 1.
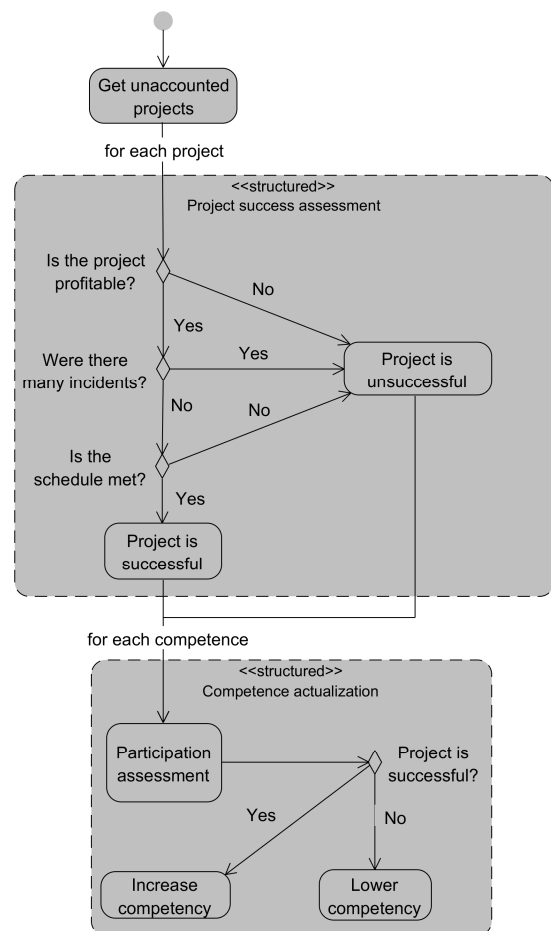

Fig. 1. Competence actualization algorithm

The algorithm starts when there are one or several projects whose results have not been analyzed. For each of such projects, the two stages are involved. The first stage is project success assessment. At this stage, the project results are analyzed to find out if the project is successful. To do this, several determining factor are compared with acceptable values defined by the project manager.

Thus, a project is successful if the following conditions are met:

- the difference between profit and costs is greater than the acceptable value;

- the number of incidents does not exceed the acceptable value; in this paper 'incidents' means unpleasant event that required additional work;

- The project was completed on time or late within the acceptable value.

The second stage is experts' competence actualization. It starts for each competence of the project participants after the project success assessment.

First, the degree of influence of this competence on the project result is determined. It depends on two indicators, see (1): the required proficiency level relative to other requirements, the expert's proficiency level relative to other participants.

$$D = ((L/P) + (r/R)) / 2, \qquad (1)$$

where D is the degree of influence of the competence on the project result; L is the proficiency level of the competence; P is the sum of all participants' proficiency levels in this competence; r is the required proficiency level for this competence; R is the sum of all required proficiency level for all competences in the project.

Expert's competence change depends on D and on whether the project is successful, see (2).

$$C' = C + M*D*s, \qquad (2)$$

where C' is competence's proficiency level after actualization; C is competence's proficiency level before actualization; M is maximal competence's proficiency level; s is 1 if the project successful, -1 otherwise. If C' is more than M, then C' = M. If C' is more than 0 and less than 1, then C' = 1. If C' is less than 0, then the competence is removed.

III. CONCLUSION

Algorithm presented in the paper considers the impact of competencies on the project outcome. Its execution speed for each project depends on amount of involved experts' competencies. The degree of influence is calculating for each competence. It depends only on competence proficiency level, so the complexity of the algorithm is linear and it depends on

project complexity. Thus, this algorithm can be used in both small and large expert networks.

Further work involves the development of an approach that implements the proposed algorithm, and its testing on real and generated data. At the same time, adjustments and additions to models are possible. They will consider

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