METHODODOLOGICAL PROVISION OF HUMAN RESOURCES MANAGEMENT IN A MULTI-PROJECT ENVIRONMENT

1. Introduction

The implementation of multi-project management as an element of ensuring the viability of a company places additional demands on the human resource management of projects in a multi-project environment [1]. Forming consistent resource requirements of the stakeholders is crucial for ensuring effective project management in a multi-project environment. The proposed methods are based on the competence approach [2], game-theoretic models of the formation and functioning of teams [3, 4]. Thus, the development of methodological support for human resource management in a multi-project environment is an urgent task. The object of research is the processes of human resource management of projects in a multi-project environment. The aim of research is creation of a methodological support for human resource management in a multi-project environment.

2. Methods of research

The conducted studies are based on the application of the approaches described in [5–7]. The main hypothesis of the study is the assumption that the effectiveness of project management depends on the effectiveness of human resource management of projects and programs. This is impossible to achieve without taking into account the existing resource constraints and requirements that are determined by the project stakeholders. Based on the analysis of PMI standards [8–10], taking into account the methodology of project-oriented resource management of the formation of adaptive teams in a multi-project environment [7], a conceptual model is proposed (Fig. 1). When forming adaptive project teams, it is proposed to use the method based on formal transformations [6]. A method of forming resource requirements is proposed, based on an analysis of stakeholder interest in human resource management processes, taking into account the loyalty of interested parties.

Method of formation of resource requirements:

Stage 1. Checking the consistency of stakeholder requirements (agreeing on a resource allocation strategy; coordinating the competence threshold; agreeing on resource requirements for project operations; agreeing on priorities for resource allocation between projects).

Stage 2. Primary check of the feasibility of the requirements [5].

Stage 3. Formation of generalized resource requirements [6].

Stage 4. Correction of the source data (performed if necessary).

Stage 5. Monitoring changes in team requirements.

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Formed requirements for a project team are the initial data for building project teams [5, 6].

3. Research results and discussion

Initial data: the set of applicants \( Q = \{q_1, q_2, ..., q_{14}\} \), the set of functions \( A = \{a_1, a_2, ..., a_5\} \), the matrix of characteristics \( C_1 \) (level of competence), \( C_2 \) (cost) (Table 1).

<table>
<thead>
<tr>
<th>Q/A</th>
<th>Characteristics ( C_1 )</th>
<th>Characteristics ( C_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( q_1 )</td>
<td>0 200 0 220 0 240 0 700 0 950 0 900</td>
<td></td>
</tr>
<tr>
<td>( q_2 )</td>
<td>500 0 0 270 0 0 700 0 0 500 0 0</td>
<td></td>
</tr>
<tr>
<td>( q_3 )</td>
<td>250 0 300 0 0 275 800 0 600 0 0 0 67</td>
<td></td>
</tr>
<tr>
<td>( q_4 )</td>
<td>0 140 0 200 0 0 700 0 0 850 0 0</td>
<td></td>
</tr>
<tr>
<td>( q_5 )</td>
<td>0 0 350 0 180 230 0 0 800 0 950 800</td>
<td></td>
</tr>
<tr>
<td>( q_6 )</td>
<td>310 0 310 0 0 200 700 0 1000 0 0 900</td>
<td></td>
</tr>
<tr>
<td>( q_7 )</td>
<td>350 150 0 0 0 800 780 0 0 0 0 0</td>
<td></td>
</tr>
<tr>
<td>( q_8 )</td>
<td>500 0 320 0 200 0 800 600 0 750 0</td>
<td></td>
</tr>
<tr>
<td>( q_9 )</td>
<td>0 170 0 200 0 250 0 400 0 300 0 900</td>
<td></td>
</tr>
<tr>
<td>( q_{10} )</td>
<td>0 0 290 0 190 0 0 500 0 800 0 0</td>
<td></td>
</tr>
<tr>
<td>( q_{11} )</td>
<td>0 0 280 245 180 0 0 0 800 700 900 0</td>
<td></td>
</tr>
<tr>
<td>( q_{12} )</td>
<td>290 0 0 0 200 0 800 0 0 0 1000 0</td>
<td></td>
</tr>
<tr>
<td>( q_{13} )</td>
<td>0 190 0 230 0 0 900 0 800 0 0 0</td>
<td></td>
</tr>
<tr>
<td>( q_{14} )</td>
<td>0 0 0 280 210 0 0 0 0 900 750 0</td>
<td></td>
</tr>
</tbody>
</table>

Determine the composition of the team with the maximum level of competence and minimum cost (priority – the level of competence) with the prohibition of combinations. Decision.

Stage 1. Define logical functions that describe the performers who are able to perform the corresponding functions:

\[
A(Q,1) = (q_1^1 v q_3^1 v q_4^1 v q_5^1 v q_{12}^1)
\]

\[
A(Q,2) = (q_2^1 v q_3^2 v q_4^2 v q_5^2)
\]

\[
A(Q,3) = (q_3^3 v q_4^3 v q_5^3 v q_{10}^3 v q_{11}^3)
\]

\[
A(Q,4) = (q_1^4 v q_2^4 v q_3^4 v q_4^4 v q_5^4 v q_6^4)
\]

\[
A(Q,5) = (q_1^5 v q_2^5 v q_3^5 v q_4^5 v q_5^5)
\]

Stage 2. Compose a generalized logical function \( F \) [6].

Stage 3. The generalized logical function is reduced to a non-collision form. After transformations, the function has the form:

\[
F = q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]

\[
v q_1 q_3 q_4 q_5 q_6 q_7 q_8 q_9 q_{10} q_{11} q_{12} q_{13} q_{14}
\]
The obtained result reflects the possible variants for building a team and the distribution of functions between performers.

Stage 4. For given matrices of characteristics $C$, determine the total characteristic of the implementation of functions by the command $C_{1}^{com}$ and $C_{2}^{com}$. Table 2 shows the characteristics of variants and the distribution of functions in variants.

### Table 2

<table>
<thead>
<tr>
<th>Variant</th>
<th>Performers</th>
<th>$C_{1}^{com}$</th>
<th>$C_{2}^{com}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 1 3 4 5 6 0 0 0 0 0 0 0 0 0</td>
<td>1380</td>
<td>4790</td>
</tr>
<tr>
<td>2</td>
<td>2 1 3 4 0 6 0 0 0 0 5 0 0 0 0 0</td>
<td>1380</td>
<td>4650</td>
</tr>
<tr>
<td>3</td>
<td>2 1 3 0 0 6 0 0 4 0 5 0 0 0 0 0</td>
<td>1380</td>
<td>4100</td>
</tr>
<tr>
<td>4</td>
<td>2 1 0 4 5 6 0 0 0 0 3 0 0 0 0 0</td>
<td>1370</td>
<td>4600</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>24</td>
<td>0 0 0 1 2 5 6 0 0 4 0 3 0 0 0 0 0</td>
<td>1250</td>
<td>4450</td>
</tr>
</tbody>
</table>

Team building variants 1–3 have a maximum level of competence – 1380. The third variant has the minimum cost: $q_1, q_3, q_5, q_6, q_{10}, q_{11}$. The application of the proposed approach allows reducing the cost of the project team by 13 % while ensuring the specified restrictions.

### 4. Conclusions

The issues of creating a methodological support for human resources management of forming adaptive teams in a multi-project environment are considered. A conceptual model of project-oriented resource management of the formation of adaptive teams in a multi-project environment is developed. Its peculiarity is the establishment of the relationship between the processes of project-oriented resource management of the formation of adaptive teams in a multi-project environment with the resource management processes of projects, programs and project portfolios. A method for the formation of resource requirements is proposed. Its essence lies in the fact that based on the analysis of the requirements of stakeholders, the generalized agreed resource requirements for projects in a multi-project environment are formed. By analyzing the interest of stakeholders in human resource management processes and taking into account the loyalty of stakeholders, it is possible to formulate agreed resource requirements for the task of forming an adaptive project team. An example of the formation of a team with given restrictions is considered.

The application of the proposed approach will improve the efficiency of project management in a multi-project environment by forming teams that meet certain requirements.

### References


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