

Сформульовано постановку задачі формування команди проекту з урахуванням міжособистісних взаємин співробітників. Для оцінки оптимальності складу команди проекту запропоновано критерій, що характеризує внесок співробітників в групову взаємодію. Розроблено алгоритм розв'язання задачі відбору кандидатів у команду проекту за критерієм сумарного внеску співробітників в групову взаємодію

Ключові слова: команда проекту, соціометрична матриця, соціометричні індекси, групова взаємодія, міжособистісні відносини у команді

Сформулирована постановка задачи формирования команды проекта с учетом межличностных отношений сотрудников. Для оценки оптимальности состава команды предложен критерий, характеризующий вклад сотрудников в групповое взаимодействие. Разработан алгоритм решения задачи отбора кандидатов в команду проекта по критерию суммарного вклада сотрудников в групповое взаимодействие

Ключевые слова: команда проекта, социометрическая матрица, социометрические индексы, групповое взаимодействие, межличностные отношения в команде

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AN ALGORITHM FOR BUILDING A PROJECT TEAM CONSIDERING INTERPERSONAL RELATIONS OF EMPLOYEES

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1. Introduction

Effective management of a project team is the basis of project management. Usually investors consider a project team as a major factor of successful project implementation. The system of management of a project team includes methods, procedures, programs of controlling the processes, connected with human resources, and ensures their constant improvement.

A team implies a social system, which consists of three and more individuals, the members of which realize their belonging to it and who interact for the achievement of a common purpose [1, 2].

A team is more than a group of people, united by the common purpose, frequently according to the formal sign, for example, the employees of one department. Interaction in the team creates a synergistic effect, which occurs because of the mutually complementing qualities of its members and is manifested in the fact that the effort of a team considerably exceeds the total efforts of its separate members.

The effectiveness of a team in many respects depends on how developed the degree of collaboration is. Teams, as a rule, are not created randomly; therefore a key factor is interpersonal relations, which make one of the most important components of organizational culture. Consequently, while building a project team, it is necessary to consider interactions of executors with each other.

To build an effective team of a project with a high level of collective interaction, it is necessary for a leader to have a tool for evaluating interpersonal relationships of candidates. Therefore, development of the method for building a project team on the basis of analysis of interpersonal relations is a relevant task. Solution of this problem will make it possible to develop information technology allowing building the team, which will correspond to the tasks of a project and ensure effective cooperation of participants. This will make

it possible to decrease financial and time costs for the project implementation.

2. Literature review and problem statement

Scientific studies in the field of human resources management over recent time have proven that a success or a failure of a group is frequently the consequence of interdependence between the capability of collective interaction in a group, confidence and integration of members of a group, as well as their professional skills [3–5]. In papers [6, 7] it is stated that to guarantee a high quality of team work, the appropriate level of the team solidarity is required. In teams with a high level of solidarity, co-workers usually demonstrate higher personal productivity. Studies [3–7] emphasize the importance of collective interaction and adherence of team members to team purposes for increasing the effectiveness of the joint work. However, they do not contain recommendations regarding how these factors can be taken into account at the stage of building a project team.

In article [8], on the basis of studying electronic business, some barriers and engines of success of projects were determined. The barriers included poorly specified processes and communications, while factors of success embraced effective management of a project team, ability of the manager and members of a project team to interact effectively and to discuss problems and methods of their solution, as well as corporative culture, shared by the team members. The leaderships and team management strategies, proposed in this paper, will work more effectively, if we select definite performers to a project whose social connections (both positive and negative) are known from the experience of previous projects.

In papers [9–13], which describe different approaches to building project teams, technical competence of colleagues

with respect to the solved tasks comes out as the basic criterion. Empirical studies, carried out in articles [3–8], showed that the outcome of team work depends not only on the level of qualification of performers, but also on the level of their motivation to the joint activity. Consequently, when developing formal methods of building project teams, it is necessary to consider not only professional habits of colleagues, but also their desire to work in one team.

3. The aim and tasks of the study

The aim of the work is the development of mathematical provision, which makes it possible to automate the process of building project teams on the basis of interpersonal relationships of employees of a company. Achieving the set goal implies the solution of the following problems:

- choice of the method of study and of evaluating the relationships between the team members;
- development of a criterion, which makes it possible to estimate the degree of participation of each individual in the system of interpersonal relationships in the team;
- development of an algorithm for the solution of problem of building a project team on the basis of the indices, which characterize the degree of participation of individuals in collective interaction.

4. Setting the task of building a project team

Let us examine the task of building a project team taking into account the interpersonal relations, established between the co-workers of a company, in the following setting.

It is assigned: $P = \{P_1, P_2, \dots, P_n\}$ is the set of candidates to the project team; $F = \{F_1, F_2, \dots, F_m\}$ is the set of functional subdivisions, the employees of which meet resource requirements of the project; $T = \{T_1, T_2, \dots, T_m\}$ is the required number of employees from each subdivision for implementation of the project.

It is necessary to determine the optimum structure of the project team $D = \{D_1, D_2, \dots, D_m\}$, where D_j is the subset of employees of the j -th subdivision, selected for the project implementation.

Objective function of this task is the summary index of interaction of the team members

$$F = \sum_{j=1}^k V(P_j) \rightarrow \max_{P_j \in P} \quad (1)$$

where $V(P_j)$ is the contribution of candidate P_j to the group interaction; k is the total number of employees, required for project implementation.

In the process of team building, the following limitations must be considered:

- each of the candidates to the team is assigned to his functional subdivision, combining functions is not allowed

$$S_j = \{s | s \in P\}, \quad j = \overline{1, m}; \quad \bigcup_{j=1}^m S_j = P; \quad \bigcap_{j=1}^m S_j = \emptyset, \quad (2)$$

where S_j is the set of candidates, assigned to the j -th subdivision;

- the number of employees from each subdivision, required for the implementation of the project, must not exceed the number of available employees of this subdivision

$$|S_j| \geq T_j; \quad (3)$$

- project team is built from the number of available employees of each subdivision

$$D_j \subset S_j \quad \forall j. \quad (4)$$

In order to solve the formulated problem, it is necessary to determine index $V(P_j)$ for each candidate. This index is determined on the basis of examining the character of interpersonal relations between the candidates to the team.

To study the character of the interpersonal relations between the employees of the company, we will use the sociometric method. Sociometry is the quantitative method, which represents actual information about the system of interpersonal relations in the group on the basis of mutual sympathies and antipathies.

5. Method of sociometric measurements

Sociometry is the theory of examining interpersonal relationships in small groups [14]. The method makes it possible to estimate and measure interpersonal relationships and emotional connections in the group on the basis of mutual sympathies and antipathies.

According to [15], a sociometric study may be conducted in order to solve the following problems:

- measurement of the degree of solidarity-dissociation in the group;
- identifying sociometric positions of group members (from “a leader” to “an outsider”);
- detection of centers of informal solidarity or dissociation in the group.

Objective evaluation of character of individual features of executors makes it possible for the project manager to manage the team effectively, increasing individual and group labor productivity [16].

However, sociometry does not explain the reasons and mechanisms of establishing social interrelations between personalities, but rather makes it possible to estimate quantitatively and to present clearly inter-group relationships, as well as to characterize their distribution. An undoubted merit of sociometric method lies in the fact that the inter-group relationships are specifically expressed in the form of tables, diagrams, graphs, and numerical magnitudes.

Initial data for conducting calculations are the results of the sociometric survey, during which each respondent is given a sociometric card. A sociometric card begins from the introduction, in which the purposes of the survey and the essence of it are explained and the request to participate in the survey is formulated. After it, the information about rules of filling the card clearly is presented.

Depending on the purposes of the study, every group member is supposed to answer the question (criterion of selection): “With whom do you want (do not want) to participate in one or another activity?” By answering the question, each participant determines his attitude to other members of the group. Survey participants record their answers in the sociometric card, which is filled up by each member of the group individually and should not be made public [17].

In this case, sociometric procedure can be carried out in two ways:

- parametric – the number of choices for the members of the surveyed group is limited in advance;
- non-parametric – the number of choices is unlimited.

Each form has its advantages and disadvantages. For example, the advantage of the parametric version of sociometric procedure is the fact that it makes it possible to reveal the so-called emotional effusiveness of each member of the group, to make the immediate analysis of a variety of interpersonal relationships in the group structure. However, with an increase in the group size, computational complexity of the procedure of analysis also increases. Another disadvantage of non-parametric procedure is a high probability of receiving a random choice.

Introduction of sociometric limitation increases the reliability of sociometric data and facilitates statistic processing of the material. From the psychological point of view, sociometric limitation makes respondents choose their answers more carefully, choose only those group members, who really suit the offered roles of a partner, a leader or a co-worker. Limitation of choices significantly decreases the probability of random answers and makes it possible to standardize conditions of choices in groups of different sizes in one sample, which allows comparing material in different groups.

A disadvantage of the parametric procedure is impossibility to reveal a variety of relationships in the group. It is possible to reveal only the most subjectively significant connections. As a result of this approach, sociometric structure of the group will reflect only the most typical, selected communications. An introduction of sociometric limitation does not allow judging about emotional effusiveness of the group members.

While filling in the sociometric card, respondents can either evaluate the group members according to the dichotomous criterion, where «+» indicates preference (positive choice), «-» is rejection (negative choice), «0» is indifferent choice, or rank all group members depending on the suggested criterion. In ranking, all group members score points that depend on the priority of a choice or rejection.

The results of sociometric survey are entered into the group matrix, which makes it possible to clearly present primary information and to simplify mathematical processing of the collected data.

In processing sociometric data, the group and individual sociometric indices usually are calculated.

The basic group sociometric indices include: index of psychological effusiveness, index of group solidarity, index of the group integration.

The basic individual sociometric indices include: sociometric status of a group member, as well as the index of emotional effusiveness.

Group members are usually categorized according to the number of obtained preferences and rejections. The following status positions of group members are distinguished:

- “Stars” – popular individuals who received the largest number of preferences in the group, and therefore, have the highest sociometric status;
- “Preferred” – popular individuals who received an average quantity of preferences;
- “Accepted” – individuals who received more preferences than rejections;
- “Isolated” – individuals who received neither preferences nor rejections;
- “Outcasts” – individuals who received more rejections than preferences.

6. Description of the algorithm for solving the problem of building a project team

Let us examine the activity of a company, which functions in the multi-project environment. Such companies usually have the matrix structure, where each employee is assigned to his functional subdivision.

During the launch of every new project, managers of a company face the task of building a project team of employees from different subdivisions taking into account resource requirements. Complex projects, as a rule, are divided into several subprojects (monoprojects). Then the task of the manager is complicated by the fact that it is necessary to build several project teams and to appoint a responsible executor or a leader.

Let us assume that all candidates are qualified enough to fulfill the project tasks. This assumption is well grounded, since employees, as a rule, pass tough selection when they are hired by a company, as well as periodic attestation at their positions.

We shall consider a situation when each candidate may take only one functional role in the project team.

The task of selecting the employees for the implementation of the project is proposed to be solved using sociometric technique.

We will use the procedure of a sociometric study, described in [18]. Let us assume that 2 people from subdivision A and one person from subdivision B and one person from subdivision C are required for the implementation of one of the monoprojects within a multi-project. 8 employees (A₁, A₂, A₃, B₁, B₂, B₃, C₁, C₂) from subdivisions A, B and C are available for participation in the project at the current moment.

Let us suppose that the project manager has results of the sociometric survey, conducted among these employees. The results of sociometric survey are presented in the form of sociometric matrix (Table 1).

Table 1

Sociometric matrix

No. of entry	Who chooses	Who of the group members is chosen								Number of choices		
		A ₁	B ₁	B ₂	A ₂	C ₁	B ₃	A ₃	C ₂	+	-	Total
1	A ₁	X	+	-	0	0	-	+	+	3	2	5
2	B ₁	0	X	0	-	0	+	-	+	2	2	4
3	B ₂	+	+	X	+	+	0	0	0	4	0	4
4	A ₂	0	-	+	X	+	0	-	+	3	2	5
5	C ₁	0	0	+	+	X	0	+	-	3	1	4
6	B ₃	-	0	+	0	0	X	0	0	1	1	2
7	A ₃	+	+	-	+	0	0	X	+	4	1	5
8	C ₂	0	+	+	-	0	-	+	X	3	2	5
Number of received choices	+	2	4	4	3	2	1	3	4	23	-	-
	-	1	1	2	2	0	2	2	1	-	11	-
Total		3	5	6	5	2	3	5	5	-	-	34

It is possible to obtain information about social interrelations between the employees of a company, if, at the end of each project, a sociometric survey is conducted among its participants, in which the question: “With whom do you want to work at the next project?” is offered as a criterion of choice. More detailed and precise information can be

obtained by interviewing employees about their attitudes to the project co-worker. Each employee is requested to confidentially estimate productivity and results of the work of his co-workers.

In the course of selecting employees to the project team, their contribution to group interaction (1) is considered. The contribution of an employee to the group interaction can be determined on the basis of the number of choices and rejections, which he receives and gives in the process of sociometric survey.

To evaluate each candidate, we will calculate his indices of sociometric status and sociometric effusiveness.

Sociometric status is the ability of an individual as an element of sociometric structure to occupy the specific spatial position (locus) in it, that is, to correlate with other elements (members of a project team) in a particular way. Sociometric status expresses the attitude of a team to each individual.

Effusiveness characterizes the need of an individual for communication, the degree of its socio-psychological activity with respect to other members of the group. Effusiveness is the function of attitude of an individual toward the group.

The index of sociometric status of the *j*-th group member C_j and the index of the emotional effusiveness of the *i*-th group member E_i are determined from formula [18]:

$$C_j = \frac{\sum_{i=1}^n (S_{ij}^+ - S_{ij}^-)}{n - 1}, \tag{5}$$

$$E_i = \frac{\sum_{j=1}^n (S_{ij}^+ - S_{ij}^-)}{n - 1}, \tag{6}$$

where S_{ij}^+ are the preferences («+») obtained by the *i*-th group member from the *j*-th group member or given to the *i*-th group member by the *j*-th group member; S_{ij}^- are the rejections («-») obtained by the *i*-th group member from the *j*-th group member or given to the *i*-th group member by the *j*-th group member; *n* is the number of candidates to the project team.

For the simplification of the process of candidate selection, let us introduce integral index, which characterizes each team member simultaneously as a subject of selection and as an object of selection. This index characterizes the contribution, made by an employee to strengthening group cohesion and, therefore, to increasing effectiveness of team work. Let us call the personal contribution of the *i*-th employee to group interaction V_i . This index can be defined as arithmetic mean of indices of sociometric status and emotional effusiveness of an individual

$$V_i = \frac{C_i + E_i}{2}. \tag{7}$$

The higher the value of this index is, the larger the contribution of an employee to an increase in effectiveness of group interaction. Consequently, while building a new team, preference should be given not only to “Stars” – colleagues with the highest value of sociometric status, but also to colleagues with the highest value of personal contribution to group interaction.

Results of the calculation of personal sociometric indices and the distribution of status positions for the group of employees in question are given in Table 2.

Table 2

Individual sociometric indices and position of employees

No. of entry	Company employee	C_i	E_i	V_i	Status position
1	A ₁	0,14	0,14	0,14	«Accepted»
2	A ₂	0,14	0,14	0,14	«Accepted»
3	A ₃	0,14	0,43	0,29	«Accepted»
4	B ₁	0,43	0	0,21	«Star»
5	B ₂	0,29	0,57	0,43	«Preferred»
6	B ₃	-0,14	0	-0,07	«Rejected»
7	C ₁	0,29	0,29	0,29	«Preferred»
8	C ₂	0,43	0,14	0,29	«Star»

The optimum structure of participants in a project team will be determined by the value of summary index of group interaction (1). For maximization of the value of this index, the employees with maximum values of index of personal contribution should be selected to the team. In accordance with resource requirements of the project, 2 people from subdivision A, 1 person from subdivisions B and one person from subdivision C should be selected to the team. The maximum value of the summary index of group interaction equal to 1,15 will be reached for 4 variants of the team structure: A₃, A₁, B₂, C₁; A₃, A₁, B₂, C₂; A₃, A₂, B₂, C₁; A₃, A₂, B₂, C₂.

Obtaining several variants of the project team structure with equal values of the objective criterion (1) is connected to the fact that the dichotomous criterion of evaluation of participants is used in sociometric survey. As a result, several people in the group obtained equal values of personal sociometric indices.

Sociometric studies with the use of the dichotomous criterion of evaluation of participants, which were carried out in groups consisting of 6–12 people, demonstrated that with an increase in a group size, the number of employees with coinciding values of the index of personal contribution (*V*) increases. The graph of dependence of the number of employees with the coinciding values of index *V* on the group size is given in Fig. 1.

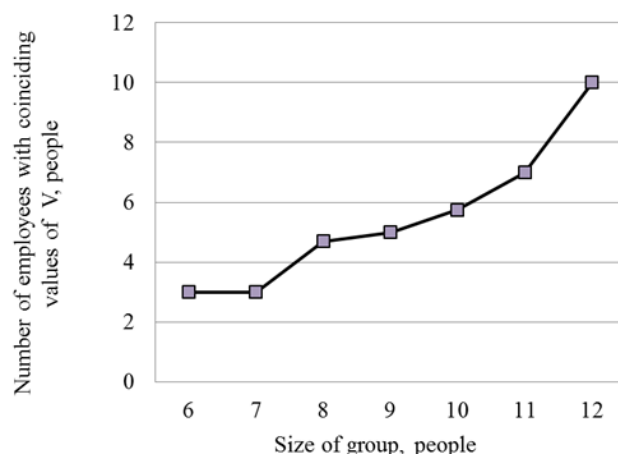


Fig. 1. Dependence of the number of employees with coinciding values *V* on the group size

Since with an increase in dimensionality of the task, the number of employees with coinciding values of sociometric indices increases, the number of variants of the project team structure with equal values of target criterion (1) will also increase.

In order to increase the spread of values of individual sociometric indices of candidates and to decrease the uncertainty in the selection of employees to the team of the project, it is proposed to use ranking of participants when conducting sociometric survey. In the scientific literature sources [18, 19], describing the ranking procedure of conducting sociometric survey, the total number of obtained points is calculated for each participant. In the process of calculating sociometric indices, not points but the dichotomous criterion of selection is used again.

Let us examine the approach to ranking the group members, which will make it possible to consider the degree of preference (rejection) each other by individuals during the calculation of individual sociometric indices.

While filling in a sociometric card, the respondents are asked to express their attitude to other members of the group using the scale of preferences by T. Saati [20]. In case of positive selection, the number of points from 1 to 9 is indicated opposite a group member's name (Table 3).

Relationships scale

Degree of significance	Definition
1	Identical significance or indifferent choice
3	Certain predominance of significance of one group member above others (weak significance)
5	Essential or strong significance
7	Evident or very strong significance
9	Absolute significance
2, 4, 6, 8	Intermediate values between two adjacent judgments

Table 3

the degree of preference, the values of sociometric status and emotional effusiveness will be within the range from 1/9 to 9. The values of indices less than 1 testify to the predominance of rejections above preferences. The values, equal to 1, testify either to equal degree of rejection and preference in assessment of the given individual, for example 1/5 and 5, or to the fact that the individual obtained neither deviations nor preferences, which in both cases indicates the indifferent attitude to him.

Now let us consider the task of building a project provided that during conducting sociometric survey, the participants were asked to rank their co-workers in accordance with the given scale of preferences. Results of sociometric survey are represented in Table 4.

Table 4

Sociometric matrix

No. of entry	Who chooses	Who of the group members are chosen								Number of given choices		
		A ₁	B ₁	B ₂	A ₂	C ₁	B ₃	A ₃	C ₂	+	-	Total
1	A ₁	5	1/3	1	1	1/7	3	9	3	2	5	
2	B ₁	1	1/5	1	1/5	1	7	1/3	7	2	4	
3	B ₂	3	7	5	9	1	1	1	4	0	4	
4	A ₂	1	1/5	3	5	1	1/7	6	3	2	5	
5	C ₁	1	1	7	3	1	5	1/4	3	1	4	
6	B ₃	1/5	1	5	1	1	1	1	1	1	2	
7	A ₃	4	5	1/6	3	1	1	7	4	1	5	
8	C ₂	1	5	3	1/7	1	1/5	6	3	2	5	
Number of obtained choices	+	2	4	4	3	2	1	3	4	23	-	
	-	1	1	2	2	0	2	2	1	-	11	
Total		3	5	6	5	2	3	5	5	-	34	

Negative choice is designated by reverse values, for example, if a tested person has an extremely negative attitude to the idea of working with the given individual, it is necessary to place 1/9 in the graph opposite his name. In contrast to the matrix of paired comparisons, sociometric matrix must not be conversely symmetrical.

When ranking group members in accordance with the relationships scale, given in Table 3, index of sociometric status of the j-th group member is defined as geometric mean of values in the j-th column of sociometric matrix

$$C_j^R = \sqrt[n-1]{\prod_{i=1}^n k_{ij}}, \tag{8}$$

where C_i^R is the sociometric status of the j-th group member; k_{ij} is the assessment, obtained by the j-th group member from the i-th group member; n is the number of people in the group.

The index of the emotional effusiveness of the j-th group member is defined as geometric mean of values in the i-th line of the sociometric matrix:

$$E_i^R = \sqrt[n-1]{\prod_{j=1}^n k_{ij}}, \tag{9}$$

where E_i^R is the emotional effusiveness of the i-th group member; k_{ij} is the assessment, given to the i-th group member by the j-th group member.

In the course of calculation of individual sociometric indices with regard to rankings participants according to

Let us calculate individual sociometric indices by formulas (8) and (9). For calculating the index of personal contribution of an employee to group interaction, we will use formula

$$V_i^R = \frac{C_i^R + E_i^R}{2}. \tag{10}$$

Results of calculating personal sociometric indices and the distribution of status positions for the considered group of employees with regard to ranking individuals according to the degree of preference are given in Table 5.

Table 5

Individual sociometric indices and positions of employees

No.	Employee of company	C_i^R	E_i^R	V_i^R	Status position
1	A ₁	1,13	1,3	1,22	«Accepted»
2	A ₂	1,03	1,14	1,09	«Accepted»
3	A ₃	1,23	1,44	1,34	«Accepted»
4	B ₁	2,09	1,18	1,64	«Preferred»
5	B ₂	1,83	2,66	2,25	«Preferred»
6	B ₃	0,79	1	0,89	«Rejected»
7	C ₁	1,72	1,59	1,66	«Preferred»
8	C ₂	2,53	1,14	1,84	«Star»

On the basis of the results, given in Table 5, the project team must be built from employees A_3 , A_1 , B_2 and C_2 since they have the highest values of the index of personal contribution to group interaction. This team structure corresponds to the maximum value of the summary index of group interaction – 6,65. In this case, all employees in the subdivisions differ from each other by the values of individual sociometric indices. Thus, it is possible to draw a conclusion that the use of the procedure of ranking individuals with filling in a sociometric card makes it possible to decrease uncertainty during selection of participants to the project team.

The algorithm for the solution of the problem of building a project team taking into account interpersonal relations consists of the following stages.

1. To conduct the ranking procedure of sociometric survey among available employees of subdivisions of a company, who meet the resource requirements of the project.

2. To calculate individual sociometric indices for each participant of the survey by formulas (8) and (9) and the index of personal contribution to group interaction by formula (10).

3. To sort out employees of each subdivision in order of decreasing of the value of index of personal contribution to group interaction.

4. To select from each subdivision T_j employees with the highest values of the index of personal contribution to group interaction.

7. Discussion of results of examining the problem of building project teams

Building a project team by the criterion of the maximum total contribution of employees to the group interaction (1) can be achieved when a candidate performs only one functional role in the project.

In many multi-project companies, the situation when employees can perform different functional roles is very common. For example, an employee can be selected to perform the functions of a system architect, a developer, a test designer or a customer interface designer in one IT-project. Therefore, every time a project team is built, it is necessary to decide for what functions it is expedient to use one or another performer. In reality, selection of employees for project implementation is influenced by many factors, such as an hourly rate of an executor, his qualification for particular types of tasks, ability to interact effectively with other participants in a team, etc.

The index of personal contribution of an employee to group interaction (10), introduced in this work, can be used

as one of the particular criteria in the overall model of multi-factor evaluation of candidates to a project team.

In addition to the criterion of selecting employees to a team, we proposed the method that allows obtaining the value of this index for each employee. Improvement of the procedure of sociometric survey, namely ranking participants according to the degree of preference, makes it possible to decrease the probability of obtaining equal values of sociometric indices for different participants of the study and in this way to decrease uncertainty in team building.

The advantage of the proposed algorithm for the selection of employees to a project team is the simplicity of implementation and low computational costs. To perform a computational procedure of this method, there is no need for developing special software, it is possible to use any tabular processor, for example, MS Excel.

The direction of further study may be development of a generalized criterion, which makes it possible to consider interpersonal relations while building a project team, as well the possibility of an employee to perform several functional roles. A genetic algorithm, which makes it possible to solve the problems of multi-criteria optimization, will be developed for the solution of this problem.

8. Conclusions

1. To solve the problem of building a project team, we selected sociometric procedure out of numerous methods of studying interpersonal relations, which makes it possible to estimate each member of the group as an object and as a subject of group interaction with the help of indices of sociometric status (5) and emotional effusiveness (6).

2. Formalization of the criterion of individual contribution of an employee to group interaction was carried out (10). This criterion is an integral characteristic, obtained on the basis of individual sociometric indices of candidates (8) and (9).

3. The algorithm for the solution of the problem of building a project team by the criterion of summary contribution of employees to the group interaction was developed. Experimental studies of the developed algorithm were carried out in the groups of candidates that consisted of 6 to 10 people. In the course of experiments it was established that by the results of sociometric survey by the dichotomous criterion, from 50 % to 80 % of candidates on average had the values of individual sociometric indices, which coincided with the values of other candidates. In the course of ranking procedure of sociometric survey, proposed in the work, all the candidates received different values of sociometric indices, which made it possible to decrease uncertainty during the selection of candidates to the project team.

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