УДК 504:625.7
DOI https://doi.org/10.24144/2616-7700.2019.2(35).134-142

H. Xu[1], A. Kuchansky[2]

[1] Taras Shevchenko National University of Kyiv, Kyiv,
Ph. D. student in the Department of Information Systems and Technologies
bao1978@gmail.com
ORCID: https://orcid.org/0000-0002-1794-3270

[2] Taras Shevchenko National University of Kyiv, Kyiv,
Associate professor of Information Systems and Technologies,
Ph. D. in Engineering, Associate professor
kuczanski@gmail.com
ORCID: https://orcid.org/0000-0003-1277-8031

THE PROBLEM OF CHOICE OF PARTNERS FOR ORGANIZATION OF COOPERATION IN THE FRAMEWORK OF SCIENTIFIC AND EDUCATIONAL PROJECTS

According to the open innovation paradigm, scientific and educational projects should be implemented in close collaboration with external agents or partners. The selection of partners is often done on the basis of the appropriateness and personal subjective preferences of the project manager. An important task of the study is to formulate criteria for selecting partners for specific project objectives. The urgent task is to formally formulate and solve the problem of multi-criteria selection of partners for the implementation of the project with the given conditions.

The article formulates the task of selecting potential partners for cooperation in the framework of scientific and educational projects. Each project in this production consists of a finite number of work packages, each of which requires the selection of contractors. For each work package of each project, a list of key selection criteria for partners should be established. To determine the optimal composition of work package contractors for each project, one can use the method of peer review aggregation. According to the results of the expert evaluation, the decision on whether to select contractors for the implementation of the relevant package is made by the project manager or decision-maker. The peculiarities of the problem statement are considered depending on the type of potential partner. In particular, for scientists, the criterion for evaluation may be publication activity on a topic that meets the objectives of the relevant work package. For associations and foundations, such criteria may be the assessment of reputation and the experience of implementing such projects. It is determined that the general selection criterion should be the knowledge and competencies possessed by the potential partner.

The paper generates general requirements for the development of information technology for the selection of potential partners of contractors of scientific and educational projects, which, when implemented, will allow to increase the efficiency of project implementation to obtain stable infrastructure, educational and scientific results in the medium and long term.

Keywords: decision making, scientific collaboration, multicriteria choice, partner selection.

1. Introduction. According to the open innovation paradigm, scientific and educational projects should be implemented in close collaboration with external agents or partners. There is a great deal of research in the formulation of partner selection requirements at the level of overall project goals. However, the theoretical and practical basis for selecting partners for local project objectives is insufficient. Formal mathematical descriptions of this problem are also insufficient. The selection of

partners is often made without any scientifically justified conclusions, only on the basis of the expediency and personal subjective preferences of the project manager. An important task is the formation of factors for the selection of partners for specific project tasks, depending on the types of partners, their competences, their possible contribution to the project (technical, innovative, legislative, scientific, etc.). The actual task is to formally formulate and solve the problem of selecting partners for the implementation of the project with the specified conditions.

It should be understood that the selection of partners is largely based on the knowledge (new or basic) that potential partners possess as project executors. It is important to distinguish such conditions that would differentiate the factors of selection of partners depending on the types of partners, tasks in the project, level of knowledge and so on. An important scientific support for the formation of a project team is the mathematical choice problem, which provides a formal justification for the rational selection of a partner.

2. Review of sources. In the context of globalization, due to the intensive development of mobility of scientific communities and to ensure openness of innovation, it is important to rationalize the choice of partners by:

1) Establishing the direction of the partners' possible contribution to the project implementation, ie assigning the partners to the appropriate category (legislative, innovative, technical, educational, scientific). For the scientific category it is necessary to identify the directions of scientific research (for individual scientists and scientific, educational institutions).

2) Carrying out the evaluation of the potential partners' activities according to clearly defined criteria, determined by the relevant category.

3) Generate vector selection criteria for potential partners and solve the multicriteria selection problem.

Partial solution of the first problem for scientific communities is made in [1]. The paper proposes a method of clustering publications of scientists by scientific fields. This method proposes two ways to find the distance between publications. The first method uses the length of the route in the citation column between publications. The second method involves calculating the similarity between annotations of publications based on the method of locally sensitive hashing.

The second problem is also partially solved for the evaluation of research activity based on the publication activity of scientists. The article [2] proposes a method of finding integral estimates of the results of research activities of scientists. The method can be used in the complex evaluation of scientists, higher education institutions and their structural units. [3] proposes a method of comprehensively evaluating the performance of higher education institutions, based on the calculation of the generalized volume of the m-simplex, the vertices of which are estimates of the activity of higher education institutions in different categories. In addition to evaluating the results of research, it is important to understand the dynamics of this assessment in the future. In [4], a method for predicting the potential of research directions is proposed.

In [5], recent scientific studies that evaluate the research activities of subjects and objects in scientific environments are analyzed. The main shortcomings of the

known methods of scientific activity evaluation are described in the paper and the ways of their solution are suggested.

In [6] it was determined that for each two subjects of scientific communities there can be three forms of relationships: partnership, competition, neutral relationships. Moreover, such relationships can be formed not only between subjects of scientific communities, but also between their individual structural units (departments, faculties, research departments, project teams, etc.). The article [6] identifies the main features of partners (universities, research institutes, public authorities, private companies, professional associations and foundations) that determine the ways of communication and cooperation between them. Key factors that influence the creation of common forms of scientific cooperation are described in [7, 8]. It is determined that the main factors are the level of reputation of the agents and the features of cooperation mechanisms, which may have certain limitations. Mathematical methods for selecting partners for cooperation are described in [9, 10]. In [11], the method of analytical hierarchy is used for this problem. In [12], it is proposed to use a modification of the genetic algorithm for this task. Theoretical aspects of the formation of factors regarding the choice of partners for cooperation in innovative projects are presented in [13]. The process of selecting partners in joint ventures is described in [14]. Some aspects of this process can be used to select partners for scientific and educational projects.

3. Setting the task of selecting partners for cooperation in the framework of scientific and educational projects. Have a complete set of scientific and educational projects or grants given $G = \{G_1, G_2, \dots G_n\}$, n - the number of projects to be contracted. Suppose a finite set of potential executors of these projects $V = \{v_1, v_2, \dots, v_t\}$, t - the number of potential performers as subjects of the educational and scientific environment. The contractors may be scientists, project managers, research institutions, higher education institutions, etc.

Any project consists of a series of work packages (work packages) $G_i = \left\{g_1^i, g_2^i, \dots g_{r_i}^i\right\}$, r_i – the number of project work packages G_i, $i = \overline{1,n}$, that run in a specific sequence and are related to results. To complete each of these work packages, you must select contractors who have the experience and competence to execute the package in a timely and efficient manner. That is, you need to find the following sets of potential performers:

$$W\left(g_j^i\right) = \left\{v_d \in V \,\middle|\, \left(v_d, g_j^i\right) \in Q^i\right\}, Q^i \subset V \times G_i, j = \overline{1,r_i}, i = \overline{1,n}, d = \overline{1,t}.$$

For each work package of each project, a list of key selection criteria for partners must be established. That is, the vectors of the evaluation criteria will look like:

$$f^{ij}(v) = \left(f_1^{ij}(v), f_2^{ij}(v), \dots, f_{N_{ij}}^{ij}(v)\right), v \in V,$$

N_{ij} – the number of evaluation criteria for potential partners of work packages of g_j^i projects G_i, $j = \overline{1,r_i}$, $i = \overline{1,n}$.

Some criteria are maximized, so we denote the set of indices of such criteria by $J_1^{ij} = \{1, 2, \dots, h_{ij}\}$. Other criteria with indexes $J_2^{ij} = \{h_{ij}+1, h_{ij}+2, \dots, N_{ij}\}$ are minimized , $J^{ij} = \{1, 2, \dots, N_{ij}\}$, $J_1^{ij} \cup J_2^{ij} = J^{ij}$. Then

$$\sum_{k \in J_1^{ij}} \lambda_k f_k^{ij}(v) \to \max, \sum_{k \in J_1^{ij}} \lambda_k = 1,$$

$$\sum_{k\in J_2^{ij}} \delta_k f_k^{ij}(v) \to \min, \sum_{k\in J_2^{ij}} \delta_k = 1,$$

there are limits to the number of potential contractors for each package and project $v \in V^{ij}$, $V^{ij} = \left\{v \in V \,|y_u^{ij}(v) \geq \rho_u^{ij},\ u = \overline{1, z_{ij}}, j = \overline{1, r_i}, i = \overline{1, n}\right\}$, where z_{ij} – the number of thresholds for the constraint vector function $y_u^{ij}(v)$. The coefficients λ_k and δ_k determines the importance of each of the criteria in the calculation of the comprehensive assessment.

The decision on whether to select contractors for the implementation of the relevant package is made by the project manager or decision-maker. To determine the optimal composition of work package contractors for each project, one can use the method of peer review aggregation.

Suppose a set of experts $E = \{E_1, E_2, \ldots, E_s\}$, s – the number of experts. Each of the experts outlines the potential performers' preferences based on the criteria vector. Incomplete benefits profile allowed. Let $\xi_{c,b}^{ij}$ – the average frequency of each of the benefits between potential performers v_c та v_b, $c \neq b$, $v_c \in V$, $v_b \in V$. Then we get a matrix of appearance preferences:

$$\Psi^{ij} = \begin{pmatrix} \xi_{1,1}^{ij} & \xi_{1,2}^{ij} & \cdots & \xi_{1,t}^{ij} \\ \xi_{2,1}^{ij} & \xi_{2,2}^{ij} & \cdots & \xi_{2,t}^{ij} \\ \vdots & \vdots & \ddots & \vdots \\ \xi_{t,1}^{ij} & \xi_{t,2}^{ij} & \cdots & \xi_{t,t}^{ij} \end{pmatrix}, j = \overline{1, r_i}, i = \overline{1, n}.$$

Using the methods of forming a collective, by the matrix of paired comparisons, the solution can be obtained for each package g_j^i of project G_i an ordered list of potential executors: $v_{k_{-1}}^{ij} \succ v_{k_{-2}}^{ij} \succ \ldots \succ v_{k_{-t}}^{ij}$, $k_1 < k_2 < \ldots < k_t$, $k_q \in \{1, 2, \ldots, t\}$, $v_{k_{-q}}^{ij} \in V^{ij}$, $q = \overline{1, t}$. Based on this list, the project manager selects specific contractors and forms a working group.

The overall formulation of the task may vary depending on which partners are considered. Universities, research institutions, private companies, governmental organizations, and individual scientists may be potential partners. Depending on the goals of such partners in the project, appropriate criteria can be selected to evaluate them. In particular, for scientists, the criterion for evaluation may be publication activity on a topic that meets the objectives of the relevant work package. In this case, we will mark the majority of all potential partner publications by

$$P(v_d) = \{p_e \in P \mid (v_d, p_e) \in T\}, T \subset V \times P, e = \overline{1, M}, d = \overline{1, t},$$

where P is the set of all scientific publications that are available in the database, $M = card(P)$.

We denote the many publications in which the scholarly publications are cited

$$C(v_d) = \left\{p_e \in P \mid (p_e, p_E) \in C, p_E \in P(v_d), E = \overline{1, M}, e \neq E\right\}, e = \overline{1, M},$$

where $C \subset P \times P$ specifies the citation of the publications.

Then the task of evaluating the results of the research activities of scientists for their selection for the project is to find for each scientist v_d, based on the given

information regarding the citation of his publications, some estimate of q_d, which may be represented as a functional

$$Q^{ij} : V \to R,$$

that is determined by the needs of the project and the relevant project package. The estimate will then look like:

$$q_d = Q^{ij}\left(P\left(v_d\right), C\left(v_d\right)\right), d = \overline{1,t}, j = \overline{1,r_i}, i = \overline{1,n}.$$

Then the benefits between scientists v_d are determined by the value of the estimate q_d. The greater the value of q_d, the greater the advantage of having a suitable scientist select for the working groups packages g_j^i projects G_i.

If a potential partner is a university or research institute and the scientific component of the activity of the institution concerned is important for the purposes of the work package, then the scheme may also be used. In this case, an estimate of the research activity is calculated for each scientist from a particular unit, or the university as a whole q_d. And the university's overall grade O will be defined as the average of the grades:

$$O = \frac{1}{t}\sum_{d=1}^{t} q_d.$$

You can also use international or Ukrainian indices such as: to evaluate universities as potential partners:

- Rating of the British consulting company Quacquarelli Symonds (QS);
- Academic Ranking of Universities of the World, compiled by the Institute of Higher Education of Shanghai Jia Tong University (Shanghai Ranking);
- Top 200 ranking;
- simplex rating [3].

Other foundations, associations and government agencies (eg ministries, agencies, etc.) may also be contractors. In this case, the selection criteria for the contractor may be the experience of implementing such projects, the degree of innovativeness in decision-making, financial capacity (if the involvement of such a contractor is associated with financial costs), reputation assessment, etc. Such criteria can be evaluated on the basis of an expert survey taking into account fuzzy statements.

The task set can be adjusted, taking into account the goals of the project as a whole and its individual packages: strategic goals, creation of new competencies, obtaining financial benefits, reducing risks, etc. Also, the selection criteria for partners may change as a result of clarifying the timing of project deliverables: during the project (after clearly defined deadlines) or after the project ends within the specified deadline, etc.

As a result of forming working groups of project packages, a consortium or project cluster is legally formalized. Possible involvement of stakeholders in the project implementation should be considered. However, exploring the possibility of

including them in a project cluster is a separate task. Because the involvement of new stakeholders or individuals at the stage where the project is already in progress requires careful consideration of the functional responsibilities of the parties, taking into account the interests of all participants in the cluster or consortium of the project.

Therefore, in order to meet the challenge of selecting partners to collaborate in scientific and educational projects, it is necessary to develop a multi-criteria or decision-making method that is suitable:

1) The evaluation criteria and alternatives should adequately reflect the complex selection processes of the project contractors, should take into account the specifics of the project, types of contractors, etc.

2) Simplicity and clarity in the interpretation of the results of the evaluation of alternatives, ie the creation of appropriate scales and descriptions of the evaluation results that would facilitate the work of the decision maker.

3) Opportunity by the decision maker who choose other alternatives if the proposed ones don't arrange. It is ensured by introducing well-defined advantages among alternatives.

4) Ability to adapt methods or use other decision-making methods, as well as export results from one method to another, which would confirm or refute the results of the evaluation.

In [5], the following basic tasks, which underlie the creation of information technology for selecting partners for scientific cooperation, are outlined:

1) Building an information model for the presentation of scientific and educational projects and their executors.

2) Construction of a method for determining the category of partner. For the scientific category, it is necessary to construct a method of identifying the directions of research of individual scientists.

3) Creation of criteria, alternatives and method of multicriteria selection of potential partners from the base of active subjects of scientific communities.

4) Building a method for evaluating potential partners.

5) Creation of an information-analytical system, which under the goals of scientific and educational projects will form a list of potential partners for cooperation.

Using these requirements, it is possible to develop a multi-criteria method of deciding on the choice of potential partner for the implementation of a scientific or educational project. This method should be based on a set of criteria, taking into account the knowledge of partners, their type, etc. Appropriate information technology can also be developed that, when implemented, will improve the efficiency of project implementation to achieve sustainable infrastructure, educational and scientific outputs in the medium and long term.

4. Conclusions and prospects for further research. The task of selecting potential partners for cooperation in the framework of scientific and educational projects is formulated. The peculiarities of the problem statement are considered depending on the type of potential partner. Each project in this production consists of a finite number of work packages, each of which requires the selection of contractors. In practice, project packages have different directions (information dissemination, management, sustainability of project results, research). Establishing partner selection criteria for each package is an important research objective. This article attempts to formalize this process in the form of a multiobjective choice problem. In the future, it is necessary to formulate an adequate list of criteria that should be evaluated as much as possible, regardless of the subjective opinion of the decision maker.

References

1. Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Biloshchytska, S., Kuzka, O., Shabala, Y., & Lyashchenko, T. (2017). A method for the identification of scientists' research areas based on a cluster analysis of scientific publications. *Eastern-European Journal of Enterprise Technologies, 5(2(89))*, 4–10. https://doi.org/10.15587/1729-4061.2017.112323
2. Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Biloshchytska, S., Kuzka, O., & Terentyev, O. (2017) Evaluation methods of the results of scientific research activity of scientists based on the analysis of publication citations. *Eastern-European Journal of Enterprise Technologies, 3(2(87)),* 4–10. https://doi.org/10.15587/1729-4061.2017.103651
3. Kuchansky, A., Andrashko, Y., Biloshchytskyi, A., Danchenko, O., Ilarionov, I., Vatskel, I., & Honcharenko, T. (2018). The method for evaluation of educational environment subjects' performance based on the calculation of volumes of M-simplexes. *Eastern-European Journal of Enterprise Technologies, 2(4(92))*, 15–25, https://doi.org/10.15587/1729-4061.2018.126287
4. Biloshchytskyi, A., Kuchansky, A., Andrashko, Y., Biloshchytska, S., Dubnytska, A., & Vatskel, V. (2017). The Method of the Scientific Directions Potential Forecasting in Infocommunication Systems of an Assessment of the Research Activity Results. In *2017 IEEE 4th International Scientific-Practical Conference Problems of Infocommunications. Science and Technology (PIC S&T).* 69–72, https://doi.org/10.1109/INFOCOMMST.2017.8246352
5. Xu, H. (2019). Review of methods of evaluation of scientific and research activity for the choice of selection of scientific partners. *Management of development of complex systems, 38*, 156 – 160, https://doi.org/10.6084/m9.figshare.9788654
6. Xu, H. & Andrashko, Y. (2019). The problem of partnership choices for scientific projects cooperation. *Management of development of complex systems, 37,* 111 – 115, https://doi.org/10.6084/m9.figshare.9783086
7. Fu, F., Hauert, C., Nowak, M. A., & Wang, L. (2008). Reputation-based partner choice promotes cooperation in social networks. *Physical Review E, 78*, 026117.
8. Wagner, C. S., & Leydesdorff, L. (2005). Network structure, self-organization, and the growth of international collaboration in science. *Research Policy, 34(10)*, 1608–1618.
9. Zhang, S., & Poulin, D. (1996). Partnership Management Within the Virtual Enterprise in a Network. In *International Conference on Engineering Management and Control,* 645–650.
10. Talluri, S., & Baker, R. C. (1996). A quantitative Framework for Designing Efficient Business Process Alliances. In *International Conference on Engineering Management and Control,* 656–661.
11. Chu, X. N., Tso, S. K., Zhang, W. J., & Li, Q. (2000). Partners Selection for Virtual Enterprises. In *Proceedings of the 3th World Congress on Intelligent Control and Automation,* 164–168.
12. Feng, W. D., Chen, J., & Zhao, C. J. (2000). Partners Selection Process and Optimization Model for Virtual corporations Based on Genetic Algorithms. *Journal of Tsinghua University (Science and Technology), 40,* 120–124.
13. Garcez, M., Sbragia, R. & Kruglianskas, I. (2014). Factors for selection partners in innovation projects – qualitative evidences from non-equity bilateral alliances in Brazilian

petrochemical leader. *Review of Administration and Innovation - RAI, 11(2),* 242–272. https://doi.org/10.5773/rai.v11i2.1292
14. Al-Khalifa, A. K., & Peterson, S. E. (1999) The Partner selection process in international joint ventures. *European Journal of Marketing, 33 (11/12),* 1064–1081.

Сюй Х., Кучанський О. Ю. Задача вибору партнерів для організації співпраці в рамках наукових та освітніх проєктів.

Згідно з парадигмою відкритих інновацій, реалізації наукових та освітніх проєктів має здійснюватись у тісній співпраці з зовнішніми агентами або партнерами. Відбір партнерів часто здійснюється керуючись доцільністю та особистими суб'єктивними перевагами менеджера проєкту. Важливою задачею дослідження є формування критеріїв відбору партнерів під конкретні завдання проєкту. Актуальною задачею є формальна постановка та розв'язання задачі багатокритеріального вибору партнерів для реалізації проєкту з заданими умовами.

В статті сформульовано задачу вибору потенційних партнерів для співпраці в рамках наукових та освітніх проєктів. Кожен проєкт в цій постановці складається зі скінченого числа робочих пакетів, для кожного з яких необхідно підібрати виконавців. Для кожного робочого пакета кожного проєкту має бути сформовано перелік ключових критеріїв відбору партнерів. Для визначення оптимального складу виконавців робочих пакетів кожного з проєктів можна використати метод агрегації експертних оцінок. За результатами проведення експертного оцінювання, рішення про те, чи обирати виконавців для реалізації відповідного пакету приймає менеджерський склад проєкту або особа, яка приймає рішення.

Розглянуто особливості постановки задачі залежно від того, до якого типу належить потенційний партнер. Зокрема для науковців критерієм оцінювання може бути публікаційна активність з теми, яка відповідає завданням відповідного робочого пакету. Для асоціацій та фундацій такими критеріями можуть бути оцінка репутації, досвід реалізації подібних проєктів. Визначено, що загальним критерієм відбору має бути знання та компетентності, якими володіє потенційний партнер.

В роботі сформовані загальні вимоги для розробки інформаційної технології вибору потенційних партнерів виконавців наукових і освітніх проєктів, яка при впровадженні дозволятиме підвищити ефективність виконання проєктів для отримання стабільних інфраструктурних, освітніх та наукових результатів в середньо та довгостроковій перспективі.

Ключові слова: прийняття рішень, наукова співпраця, багатокритеріальна задача вибору, вибір партнерів.

Список використаної літератури

1. A method for the identification of scientists' research areas based on a cluster analysis of scientific publications / A. Biloshchytskyi, A. Kuchansky, Yu. Andrashko et al. *Східно-Європейський журнал передових технологій.* 2017. Т.5(2(89)). С. 4–10. DOI: https://doi.org/10.15587/1729-4061.2017.112323.
2. Evaluation methods of the results of scientific research activity of scientists based on the analysis of publication citations / A. Biloshchytskyi, A. Kuchansky, Yu. Andrashko et al. *Східно-Європейський журнал передових технологій.* 2017. Т.3(2(87)), С. 4–10. DOI: https://doi.org/doi:10.15587/1729-4061.2017.103651.
3. The method for evaluation of educational environment subjects' performance based on the calculation of volumes of M-simplexes / A. Kuchansky, Yu. Andrashko, A. Biloshchytskyi et al. *Східно-Європейський журнал передових технологій.* 2018. Т.2(4(92)), С. 15–25. DOI: https://doi.org/10.15587/1729-4061.2018.126287.
4. The Method of the Scientific Directions Potential Forecasting in Infocommunication Systems of an Assessment of the Research Activity Results / A. Biloshchytskyi, A. Kuchansky, Yu. Andrashko et al. 2017 IEEE 4th International Scientific-Practical Conference Problems of Infocommunications. Science and Technology (PIC S&T). С.69–72. DOI: https://doi.org/10.1109/INFOCOMMST.2017.8246352

5. Xu H. Review of methods of evaluation of scientific and research activity for the choice of selection of scientific partners. *Management of development of complex systems.* 2019. №38. C.156–160. DOI: https://doi.org/10.6084/m9.figshare.9788654.
6. Xu H., Andrashko Yu. The problem of partnership choices for scientific projects cooperation. *Management of development of complex systems.* 2019. №37. C.111 – 115. DOI: https://doi.org/10.6084/m9.figshare.9783086.
7. Fu F., Hauert C., Nowak M.A., Wang L. Reputation-based partner choice promotes cooperation in social networks. *Physical Review.* 2008. E 78, 026117. DOI: https://doi.org/10.1103/PhysRevE.78.026117
8. Wagner C. S., Leydesdorff L. Network structure, self-organization, and the growth of international collaboration in science. *Research Policy.* 2005. № 34 (10). P.1608–1618.
9. Zhang S., Poulin D. Partnership Management Within the Virtual Enterprise in a Network. *International Conference on Engineering Management and Control.* 1996. P. 645–650.
10. Talluri S., Baker R. C. A quantitative Framework for Designing Efficient Business Process Alliances. *International Conference on Engineering Management and Control.* 1996. P. 656–661.
11. Chu X. N., Tso S. K., Zhang W. J., Li Q. Partners Selection for Virtual Enterprises. *Proceedings of the 3th World Congress on Intelligent Control and Automation.* 2000. P. 164–168.
12. Feng W. D., Chen J., Zhao C. J. Partners Selection Process and Optimization Model for Virtual corporations Based on Genetic Algorithms. *Journal of Tsinghua University* (*Science and Technology*). 2000. №40. P.120–124.
13. Garcez M., Sbragia R., Kruglianskas I. Factors for selection partners in innovation projects – qualitative evidences from non-equity bilateral alliances in Brazilian petrochemical leader. *Review of Administration and Innovation - RAI.* 2014. Vol. 11/2. P.242-272. 11. 241. DOI: https://doi.org/10.5773/rai.v11i2.1292.
14. Al-Khalifa A. K., Peterson S. E. The Partner selection process in international joint ventures. *European Journal of Marketing.* 1999. Vol.33 (11/12). P.1064-1081.

Одержано 09.10.2019