The Possibility of Artificial Intelligence in the Development of the Third Mission of Universities[*]

S. O. Kramarov[*], V. A. Bezuevskaya, V. V. Khramov
Surgut State University, Surgut, Rusia
1 Lenina St., Surgut 628412, Tyumen region, Russia
[*] maoovo@yandex.ru

Abstract

One of the main goals of the modern development of universities in the world is to promote social, cultural and economic development of the society in which these institutions operate through the creation, implementation, expansion, dissemination and use of new knowledge, establishing direct relationships with the region and all its components, which, in turn, provide the basis for the development of education itself, based on projects to solve real problems. At the same time, the assessment of the involvement of the University in the solution of actual problems of the region is carried out on the basis of theoretical designs, models and criteria that form the "signs (indicators) of success". This approach strengthens the position of the University as a driving force of innovation and development of the region at any level, and one of the main roles here can be played by the network development of universities, based on the intellectual analysis of data on the current state, on the one hand, of the science in the University and, on the other hand, the situation in the economy and social sphere. In Europe, this approach is called the "Third mission of universities". The article considers the use of several types of fuzzy hybrid models used in studies of the interaction between the University and the region, which improve the quality of evaluation of its effectiveness.

Keywords: success indicator model, data mining, hybrid intelligent modeling, the third mission of the University, innovation.

[*] The present paper was prepared on the basis of the report presented at the "2nd World Conference on Robotics and Artificial Intelligence (WCRAI-2019)" (June 10-12, 2019, Osaka, Japan).

Возможности искусственного интеллекта в развитии третьей миссии университетов[*]

С. О. Крамаров[*], В. А. Безуевская, В. В. Храмов
Сургутский государственный университет, г. Сургут, Россия
628412, Россия, г. Сургут, ул. Ленина, д. 1
[*] maoovo@yandex.ru

Аннотация

Одной из основных целей современного развития университетов в мире является содействие социальному, культурному и экономическому развитию общества, в котором эти учебные заведения функционируют посредством создания, внедрения, расширения, распространения и использования новых знаний, налаживания прямых взаимосвязей с регионом и всеми его составляющими, что, в свою очередь, служит основанием для развития самого образования, основанного на проектах по решению реальных проблем. При этом оценка вовлеченности вуза в решение актуальных проблем региона проводится на базе теоретических конструкций, моделей и критериев, формирующих «признаки (индикаторы) успешности». Такой подход укрепляет позицию вуза как движущей силы инноваций и развития региона любого уровня, причем одну из главных ролей здесь может сыграть сетевое развитие университетов, опирающееся на интеллектуальный анализ данных о текущих состояниях, с одной стороны, науки в вузе и, с другой стороны, ситуаций в экономике и социальной сфере. В Европе этот подход называют «Третьей миссией университетов». В статье рассмотрено использование нескольких типов нечетких гибридных моделей, применяемых при исследованиях взаимодействия вуз-регион, обеспечивающих повышение качества оценки его эффективности.

Ключевые слова: модель индикатора успешности, интеллектуальный анализ данных, гибридное интеллектуальное моделирование, третья миссия университета, инновации.

[*] Статья подготовлена на основе доклада, представленного авторами на международной конференции «2nd World Conference on Robotics and Artificial Intelligence (WCRAI-2019)" (10-12 июня 2019 г., Осака, Япония).

Modern
Information
Technologies
and IT-Education

Introduction

The strategy of development of a modern University only then becomes the most important factor of successful activity if it is focused on innovations. At the same time, earlier universities were considered quite successful, based on the rational use and development of their internal potential. For the modern approach, the University needs a fundamentally new strategy that can ensure the dynamics of development, its adaptation to rapidly changing conditions, both external and internal. The strategy of the educational institution should be based on its own and accessible to the use of intellectual potential as the basis of the University, to carry out innovative activities based on the ever-changing and increasing requirements for the quality of education through flexible regulation of the learning process with a focus on achieving the goals of students in the future. The innovative strategy monitors the existing and emerging trends of the social environment, provides a vision of the future, implementing a view from the future to the present.

The third mission of the University and regional development

The fact that modern higher education should take an active part in solving the problems of development of the country and, first of all, its region, contribute to their economic, social and cultural growth, has been clear for a long time. Therefore, together with their first and second missions of the University, it is able to realize, respectively, and the third mission, which is usually [1] is understood as the idea of the involvement of the University in the solution of important problems of the region and the country as a whole.

It is assumed that "the third mission includes several activities, for example:

- technology transfer,
- continuing education,
- social development, etc."[2]

These activities are "related to the production, use and application of knowledge and other opportunities that the University has outside the traditional academic environment"[1].

It is noteworthy that this idea of "involvement", on the one hand, "transforms the relations between the University and external organizations focused on making a profit, on joint analysis and search for solutions to important social problems, on the development of cultural capital, etc., as it involves the formation and development of certain practices that effectively implements the relationship between the University and various stakeholders, and on the other, – it transforms the internal ethos of the University, emphasizing the need (and the responsibility of the University to society) not only to transfer modern knowledge to graduates, to form their practice-oriented skills and entrepreneurial culture, but also a sense of social responsibility, the ability to engage in dialogue, understanding the importance of multicultural diversity» [3].

From the point of view of the transformation of the internal ethos of the University, the main problem is that "when inclusion is on the agenda, those who determine the internal and external policy of the University, there is a serious challenge, which is to achieve a situation, that the idea of involvement is implemented from within, in the practice of scientific and educational activities, and does not exist separately as a Supplement"[2].

Taking into account the attitude of society to the evaluation of the University's implementation of its first and second missions, it is assumed that "looking at each University individually, we have the right to answer the question of what should be expected from it in terms of assessing the effectiveness of research, in terms of the results of educational activities, in terms of commercialization and internationalization, in terms of promoting and participating in public development projects"[4]. In contrast to the assessment of the first two missions, which has evolved over many decades, the evaluation of the University's third mission is difficult in many ways. This is due to a large number of inaccuracies, uncertainties and fuzziness both in the approaches themselves and in the devices used at the moment.

Education standards define only the most General characteristics of priorities. Concrete, regional universities have unique properties and, therefore, ranking, exhibition priorities should be and will be unique. Accordingly, the criteria formed from these indicators will vary. This also applies to the evaluation criteria for their third mission: "the interpretation of what to include in the definition of the third mission significantly depends on which country (and in Russia also in what region) we are"[4], and what context we consider [5- 9].

Stakeholders in the third mission

In the most general case, the stakeholders involved in the model of "intellectual education management" can be defined as "the subjects defending their interests regarding the issue to be considered, as individuals or representatives of groups that directly influence or may influence the result, as well as those who will be affected by this result" [1]. From the point of view of strategic management [2], "stakeholders are any group or individual that can affected (or be affected as a result of) the achievement of goals, which means that we must understand the strategies of each of the stakeholders and relate them to ours [4]. At the same time, all these actors are active participants in the development and adoption of synergistic decisions for the development of the region, but also interested in the expected results and consequences of these decisions. It requires maximum openness from the University, systemic thinking, development of social capital, the desire for integration, taking into account all the identified uncertainties and uncertainties, requires responsibility to society. It should be noted that the "University – Society" system is active [9], [10] and has the corresponding advantages and disadvantages inherent in such systems. Among the advantages of such systems is the ability to adapt to changing conditions in a fairly wide range. Among the disadvantages – a significant nonlinearity and fuzziness, due to the human factor.

As it turned out during the research, such an organizational system with "high levels of stakeholder engagement:

- plans and implements the process of interaction with a large number of stakeholders;
- actively negotiating with stakeholders to reduce costs;
- pays great attention to the needs of stakeholders; conducts market segmentation in order to better meet their needs;
- involves experts on specific stakeholders in strategic planning;
- acts ahead of the curve, anticipating the needs of stakeholders, actively interfering in their outer space;
- distributes its resources according to the problems of those stakeholders who will have the greatest impact on the development;

The more an organization invests in support of its major stakeholders and actively forms a space around itself, the greater the likelihood of success in the future" [2]. "Now universities should be focused on the profession of the future. Universities have to live what their graduates will live in 5-10 years. The University should be at the center of regional and sectoral ecosystems, focusing on the tools and resources of cluster and sectoral development" [3].

Within the framework of such integration, we can talk about the "entrepreneurial University" [19] implementing its third mission, of course belonging to it. The success of the integration of the region's subjects depends not only how they solve their internal problems, but also how they are turned "outside", i.e. have the desire and ability to actively act as "stakeholders", to coordinate their problems and prospects.

The advantages of synergistic activities of stakeholders in the implementation of the third mission of the University are intuitively clear and obvious, but it is difficult to build an adequate model describing such "involvement" without resorting to a large number of restrictions. In fact, creating such involvement in the collective interaction of many groups of subjects and organizations, we have to deal with a complex system such as System of systems (SoS) [9]. Among the many problems that accompany the process of collective decision-making by interested agents within the active [5,6] system, "we can distinguish the following:

- the lack of a common schema;
- conflict of interest;
- the lack of capacity/ insufficient potential;
- too many different stakeholders;
- different degree of involvement;
- management problem;
- barriers to the development of dialogue" [3].

Details of the nature of these problems and possible mechanisms to overcome them were discussed in a number of publications [10-14].

It should be noted that the main problem of the System of systems obtained in this way is that from the point of view of its efficiency not all its interested active subsystems (agents) are equally important for decision-making.

Moreover, "the organization of the collective decision-making process presupposes that we already have:

- criteria for how the decision-making process will proceed;
- criteria for assessing the actual participation and potential impact of participants on the decision;
- criteria for how agreements on the "rules of the game" and their modification or preservation are reached;
- criteria for supporting and taking into account the views of those who, by definition, will be in the minority and whose interests will be more adversely affected.

The University, as a mediator of social development, should be given the role of one who controls the selection process of stakeholders, who has the power to resolve conflicts, and who will be responsible for how the results of the common discussion will affect the specific steps that the University and the relevant stakeholder will take" [3]. Definite indicators can show how well the University is performing its third mission.

Formation of criteria for the success of university of the third mission

Criteria for the success of all university missions have a common methodological and factual basis. Therefore, they can have interchangeability, including functional and statistical ones. In this sense, the first educational mission is involved in the formation of individual and social "inhabitancy" within a single geographic information space [15] of the region and the state as a whole.

Indicators of involvement of the University in social development of society, the solution of socially significant problems will be evaluated on the basis of Soft Computing.

Interaction between the University and the region involves mutual influence. It is considered that "local universities that form the social and cultural capital of the region and have a significant impact on the growth of the regional economy and regional welfare in a whole. Of course, in this case, no set of indicators can claim to cover absolutely all the variety of practices and factors of implementation of the third mission of the University"[12].

In general case, there is a need for a universal approach to the formation of a generalized set of indicators that would allow to evaluate any University, without depending on the region. In such a model, the regional component can be considered only as a part, and the priority factor will be the indicator of "involvement".

Indicator models of success

There are quite a few models in the available sources of information that allow comparing the success of different universities in the implementation of the third mission. We consider and compare two typical examples of building models of indicators of success of "involvement" of the University in solving problems of regional development.

The criteria of comparison selected with the aim "to assess the success of implementation of the strategy and results of the involvement of the University in the solution of regional problems; to help universities to define the strategy and choose priorities; to create conditions for the development of partnerships with other organizations in the region"[12]. The proposed model is focused on assessing the contribution of this University to the development of this region. In researched model there are "standard" [15], [16] five (one of the studied options) groups of indicators (regional infrastructure; human capital; business development; interactive education and social capital; cultural development), each of which meet its own criteria for comparative analysis.

For example, the group "regional infrastructure" includes indicators of how the University participates in interactions with the region to analyze and study the necessary steps to resolve current problems. Among the indicators of success - the involvement of the University in the processes of planning and assessing the quality of regional infrastructure, the development of relations for the practical training and internships of students, etc.

The group "human capital" is devoted to the analysis of the educational policy of the University, in particular, the orientation of curricula to the needs of the population. Among the indicators: monitoring and forecasting of the regional labor market, the involvement of employers in the educational process, etc.

The "business development" group evaluates the interaction with the local business community and the development of various business initiatives. In a number of indicators: the creation of joint

ventures, support for the development of "entrepreneurial culture", both inside and outside the University, the orientation of graduates to create their own companies, etc.

The group "cultural development" is devoted to the analysis of cultural and educational policy of the University, in particular, the organization and participation in cultural and educational activities, the exchange of student groups with Russian and foreign universities. Among the indicators: monitoring of cultural and educational life of the region, etc.

The group "interactive education and social capital" is devoted to the analysis of the University's opportunities to provide the population with additional knowledge, in particular, the organization of the second higher or special education, retraining of "pre-pensioners", retraining in newly emerged specialties. Among the indicators: analysis of social tension, monitoring of the labor market for socially vulnerable segments of the population.

Solving the problems of regional development at the rate of their appearance involves the interaction of a large number of stakeholders. Any model of involvement of the University involves the solution of complex, multi-criteria problems [12], the solution of which is based on science and using University practices, the purpose of which is to provide the best quality of decision-making, ensuring that at all stages the voices of the main stakeholders would not only be heard, but also aggregated in the procedures for making these decisions. For this purpose, the fuzzy-logical method of modeling was tested and successfully applied [17], [18].

Conclusion

Thus, the system of fuzzy indicators and built on them criteria for assessing the implementation of the "third mission" of the University should reflect the functional structure of the interaction of stakeholders, among which the University should occupy a decisive place.

Informative system analysis of interaction between the University and other stakeholders will reveal the state and prospects of interaction of all participants, their real motivation in the process of socio-economic development of the region.

One of the possible directions of the implementation of the third mission of the University should be a principally new system of University management, which minimizes the impact of "human factor". It may be, including man-made and anthropomorphic robots.

References

[1] Hemmati M. Multi-Stakeholder Processes for Governance and Sustainability. Earthscan, London, 2002, pp. 2. Available at: http://minuhemmati.net/wp-content/uploads/Hemmati-2002.pdf (accessed 15.06.2019). (In Eng.)

[2] Freeman R.E. Strategic Management: A Stakeholder Approach. Cambridge University Press, 2010, pp. 78-80. (In Eng.)

[3] Golovko N.V., Zinevich O.V., Ruzankina E.A. University's third Mission and Stakeholder Governance for Regional Development. *Comparative Politics Russia.* 2018; 9(1):5-17. (In Russ., abstract in Eng.) DOI: 10.24411/2221-3279-2018-00001

[4] Logunova O.S. The Principles of High School Innovation Strategy Realization. *Quality. Innovations. Education.* 2012; 11(90):8-13. Available at: https://elibrary.ru/item.as-p?id=18758253 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[5] Kramarov S.O. To the question of training in a society whose economy is based on knowledge. *Education and science-the main resource of the third millennium Commemorative materials of the international scientifically-practical Conference.* Publisher: IMBL, Rostov-on-Don, 2006, pp. 51-54. Available at: https://elibrary.ru/item.asp?id=34857407 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[6] Kramarov S.O. On competitiveness of higher education in Russia (distance-learning round table). *Vestnik Analitiki.* 2010; 3:92-97. Available at: http://www.isoa.ru/docs/vestnik_2010-341.pdf (accessed 15.06.2019). (In Russ.)

[7] Kramarov S.O. The centres of socio-humanistic technologies as the instrument of formation of effective management system of regional development. *Intellectual resources development regions of Russia.* 2012; 102-108. Available at: https://elibrary.ru/item.asp?id=32475922 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[8] Kramarov S.O. Problems of the Revival the Lost Scientific Contacts with the Partners of the Post-Soviet Space. *Intellektual'nye Resursy – Regional'nomu Razvitiyu.* 2017; 2:163-170. Available at: https://elibrary.ru/item.asp?id=32367708 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[9] Kramarov S.O., Khramov V.V. A Systems Engineering Approach to the Study of Complex Multivariate Systems Based on Soft Models. *Intellektual'nye Resursy – Regional'nomu Razvitiyu.* 2018; 4(1):222-228. Available at: https://elibrary.ru/item.asp?id=36739538 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[10] Novikov D.A. *Teoriya upravleniya obrazovatel'nymi sistemami* [The theory of management of educational systems]. Narodnoe obrazovanie, Moscow, 2009. (In Russ.)

[11] Jamshidi M. System of Systems Engineering: Innovations for the Twenty-First Century. John Wiley & Sons, 2009. 1240 pp. (In Eng.)

[12] Marhl M., Pausist A. Third Mission Indicators for New Ranking Methodologies. *LIFELONG EDUCATION: The XXI century.* 2013; 1:1-13. (In Russ., abstract in Eng.) DOI: 10.15393/j5.art.2013.1949

[13] Molas-Gallart J., Salter A., Patel P., Scott A., Duran X. Measuring Third Stream Activities. Final Report to the Russell Group of Universities. University of Sussex, Brighton, 2002. (In Eng.)

[14] Charles D., Benneworth P. Evaluating the Regional Contribution of an HEI: A Benchmarking Approach. Newcastle upon Tyne: University of Newcastle, 2002. (In Eng.)

[15] Khramov V.V. Generating objects models of intellectual space. Theory and use for control of complex systems. *Management in social, economic and technical systems. Proceedings of the inter-Republican scientific conference.* Kislovodsk. 2000; 67-68. Available at: https://elibrary.ru/item.asp?id=32737843 (accessed 15.06.2019). (In Russ.)

[16] Khramov V.V. Decision-making problems in the study of multi-criteria objects in a fuzzy information environment. *Problems of ensuring the efficiency and sustainability of complex technical systems. Materials XXI Interdepartmental scientific and technical conference.* Serpukhov. 2002; 120-124. Available at: https://elibrary.ru/item.asp?id=32877415

(accessed 15.06.2019). (In Russ.)

[17] Khramov V.V. Features the majority of processing fuzzy Informatii. *Spectral methods of information processing in scientific research Reports of the I All-Russian conference (Spectr-2000).* Russian Foundation for basic research, Institute of mathematical problems of biology, Russian Academy of Sciences. 2000; 136-138. Available at: https://elibrary.ru/item.asp?id=32656899 (accessed 15.06.2019). (In Russ., abstract in Eng.)

[18] Khramov V.V. Method of aggregation of several sources of fuzzy information. *Izvestiya SFedU. Engineering Sciences.* 2001; 3(21):52-53. Available at: https://elibrary.ru/item.asp?id=12886331 (accessed 15.06.2019). (In Russ.)

[19] Golovko N.V., Ruzankina E.A. Entrepreneurial University: Academic Capitalism And Multiuserrs' Management. *Vlast'* = The Power. 2016; 24(5):67-74. Available at: https://elibrary.ru/item.asp?id=26113872 (accessed 15.06.2019). (In Russ., abstract in Eng.)

About the authors:

Sergey O. Kramarov, Chief researcher, Surgut State University (1 Lenina St., Surgut 628412, Tyumen region, Russia), Dr.Sci. (Phys.-Math.), Professor, ORCID: http://orcid.org/0000-0003-3743-6513, maoovo@yandex.ru

Valeria A. Bezuevskaja, Associate Professor, Vice-Rector for development, science and innovation work, Surgut State University (1 Lenina St., Surgut 628412, Tyumen region, Russia), Ph.D. (Pedagogy), Associate Professor, ORCID: http://orcid.org/0000-0002-5744-0811, bva1003@list.ru

Vladimir V. Khramov, Senior researcher, Surgut State University (1 Lenina St., Surgut 628412, Tyumen region, Russia), Ph.D. (Technology), ORCID: http://orcid.org/0000-0003-1848-8174, vxpamov@inbox.ru

All authors have read and approved the final manuscript.

Список использованных источников

[1] *Hemmati M.* Multi-Stakeholder Processes for Governance and Sustainability. Earthscan, London, 2002. Pp. 2. URL: http://minuhemmati.net/wp-content/uploads/Hemmati-2002.pdf (дата обращения: 15.06.2019).

[2] *Freeman R. E.* Strategic Management: A Stakeholder Approach. Cambridge University Press, 2010. Pp. 78-80.

[3] *Головко Н. В., Зиневич О. В., Рузанкина Е. А.* Третья миссия университета и модель многопользовательского управления для регионального развития // Сравнительная Политика. 2018. Т. 9, № 1. С. 5-17. DOI: 10.24411/2221-3279-2018-00001

[4] *Логунова О. С.* Принципы реализации инновационной стратегии высшего учебного заведения // Качество. Инновации. Образование. 2012. № 11(90). С. 8-13. URL: https://elibrary.ru/item.asp?id=18758253 (дата обращения: 15.06.2019).

[5] *Крамаров С. О.* К вопросу о подготовке специалистов в обществе, экономика которого основана на знаниях // Образование и наука – основной ресурс третьего тысячелетия. Материалы Юбилейной международной научно-практической конференции. Ростов-на-Дону: Институт управления бизнеса и права, 2006. С. 51-54. URL: https://elibrary.ru/item.asp?id=34857407 (дата обращения: 15.06.2019).

[6] *Крамаров С. О.* О конкурентности высшего образования в России (Заочный «круглый стол») // Вестник аналитики. 2010. № 3. С. 92-97. URL: http://www.isoa.ru/docs/vestnik_2010-341.pdf (дата обращения: 15.06.2019).

[7] *Крамаров С. О.* Центры социально-гуманитарных технологий как инструмент формирования эффективной системы управления развитием региона // Интеллектуальные ресурсы развития регионов России. Научно-образовательный форум. Ростов-на-Дону: Институт управления бизнеса и права, 2012. С. 102-108. URL: https://elibrary.ru/item.asp?id=32475922 (дата обращения: 15.06.2019).

[8] *Крамаров С. О.* Проблемы возрождения утраченных научных связей с партнерами на постсоветском пространстве // Интеллектуальные ресурсы – региональному развитию. Ростов-на-Дону: Южный университет (ИУБиП). 2017. № 2. С. 163-170. URL: https://elibrary.ru/item.asp?id=32367708 (дата обращения: 15.06.2019).

[9] *Крамаров С. О., Храмов В. В.* Системно-инженерный подход к исследованиям сложных многомерных систем на основе мягких моделей // Интеллектуальные ресурсы – региональному развитию. Ростов-на-Дону: Южный университет (ИУБиП). 2018. Т. 4, № 1. С. 222-228. URL: https://elibrary.ru/item.asp?id=36739538 (дата обращения: 15.06.2019).

[10] *Новиков Д. А.* Теория управления образовательными системами. М: Народное образование, 2009. 452 с.

[11] *Jamshidi M.* System of Systems Engineering: Innovations for the Twenty-First Century. John Wiley & Sons, 2009. 1240 pp.

[12] *Мархл М., Паусист А.* Методология оценки третьей миссии университетов // Непрерывное образование: XXI век. 2013. Выпуск 1. С. 1-13. DOI: 10.15393/j5.art.2013.1949

[13] *Molas-Gallart J., Salter A., Patel P., Scott A., Duran X.* Measuring Third Stream Activities. Final Report to the Russell Group of Universities. University of Sussex, Brighton, 2002.

[14] *Charles D., Benneworth P.* Evaluating the Regional Contribution of an HEI: A Benchmarking Approach. Newcastle upon Tyne: University of Newcastle, 2002.

[15] *Храмов В. В.* Генерация моделей объектов интеллектуального пространства. Теория и использование для управления сложными системами // Управление в социальных, экономических и технических системах. Труды межреспубликанской научной конференции. Кисловодск, 2000. **С.** 67-68. URL: https://elibrary.ru/item.asp?id=32737843 (дата обращения: 15.06.2019).

[16] *Храмов В. В.* Задачи принятия решений при исследовании многокритериальных объектов в нечеткой информационной среде // Проблемы обеспечения эффективности и устойчивости функционирования сложных технических систем. Материалы XXI межведомственной научно-технической конференции. Серпухов, 2002. С. 120-124. URL: https://elibrary.ru/item.asp?id=32877415 (дата обращения: 15.06.2019).

[17] *Храмов В. В.* Особенности мажоритарной обработки нечеткой информации // Спектральные методы обработки информации в научных исследованиях. Доклады I Всероссийской конференции (Спектр-2000). Российский фонд фундаментальных исследований, Институт математических проблем биологии РАН. Пущино, 2000. С. 136-138. URL: https://elibrary.ru/item.asp?id=32656899 (дата обращения: 15.06.2019).

[18] *Храмов В. В.* Способ агрегирования нескольких источников нечеткой информации // Известия ТРТУ. 2001. Т. 3, № 21. С. 52-53. URL: https://elibrary.ru/item.asp?id=12886331 (дата обращения: 15.06.2019).

[19] *Головко Н. В., Рузанкина Е. А.* Предпринимательский университет: академический капитализм и многопользовательское управление // Власть. 2016. Т. 24, № 5. С. 67-74. URL: https://elibrary.ru/item.asp?id=26113872 (дата обращения: 15.06.2019).

Об авторах:

Крамаров Сергей Олегович, главный научный сотрудник, Сургутский государственный университет (628412, Россия, г. Сургут, ул. Ленина, д. 1), доктор физико-математических наук, профессор, ORCID: http://orcid.org/0000-0003-3743-6513, maoovo@yandex.ru

Безуевская Валерия Александровна, проректор по развитию, научной и инновационной работе, Сургутский государственный университет (628412, Россия, г. Сургут, ул. Ленина, д. 1), кандидат педагогических наук, доцент, ORCID: http://orcid.org/0000-0002-5744-0811, bva1003@list.ru

Храмов Владимир Викторович, старший научный сотрудник, Сургутский государственный университет (628412, Россия, г. Сургут, ул. Ленина, д. 1), кандидат технических наук, ORCID: http://orcid.org/0000-0003-1848-8174, vxpamov@inbox.ru

Все авторы прочитали и одобрили окончательный вариант рукописи.