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# MANAGEMENT OF UNIVERSITY RESEARCH ACTIVITIES IN THE "OPENSCIENCE" CONCEPT

## GESTIÓN DE LAS ACTIVIDADES DE INVESTIGACIÓN UNIVERSITARIA EN EL CONCEPTO "OPENSCIENCE"

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## ABSTRACT

The purpose of the article is to identify the features of the management of university research activities in the "OpenScience" concept. The article focuses on the main aspects of research activity management and the OpenScience, concept, identifies the areas of research activity management, defines the basic principles of research activity management, and possible digital tools for implementing research activity management in OpenScience (to meet the internal needs of the university). The authors conclude that the management of research activities at the university in the OpenScience concept requires the achievement of key standards in specific areas of the university's activities and must comply with certain principles of research management. In this connection, it is relevant to develop and use institutional research management policies at universities aimed at improving the quality of research and implementing the key ideas of the OpenScience concept.

## Keywords:

Research activities, open science, digital tools, management areas, management principles, management procedure.

## RESUMEN

El propósito del artículo es identificar las características de la gestión de las actividades de investigación universitaria en el concepto "OpenScience". El artículo se centra en los aspectos principales de la gestión de la actividad de investigación y el concepto OpenScience, identifica las áreas de la gestión de la actividad de investigación, define los principios básicos de la gestión de la actividad de investigación y las posibles herramientas digitales para implementar la gestión de la actividad de investigación en OpenScience (para cumplir con los requisitos internos). necesidades de la universidad). Los autores concluyen que la gestión de las actividades de investigación en la universidad en el concepto de OpenScience requiere el logro de estándares clave en áreas específicas de las actividades de la universidad y debe cumplir con ciertos principios de gestión de la investigación. En este sentido, es relevante desarrollar y utilizar políticas institucionales de gestión de la investigación en las universidades orientadas a mejorar la calidad de la investigación e implementar las ideas clave del concepto OpenScience.

## Palabras clave:

Actividades de investigación, ciencia abierta, herramientas digitales, áreas de gestión, principios de gestión, procedimiento de gestión.

## INTRODUCTION

Universities have been one of the accelerators of progress by strengthening the research component, incubating innovations, and technology transfer in the late 20th – early 21st centuries (Kogan, 2007). The need to strengthen the institutional capacity of higher education institutions actualizes the use of a modern management paradigm in universities, in particular in the management of research activities (Bleiklie & Kogan, 2007). The experience of leading universities in the UK shows that research governance is a powerful resource for improving the quality of research (Shaw, Boynton, & Greenhalgh, 2005). An important component of research management at universities are policies and procedures to ensure research integrity, aimed at preventing misbehavior in conducting research.

Currently, the problems of transformation of university management and ensuring academic integrity in the university environment remain relevant.

A special feature of the development and implementation of institutional policies for the management of research activities at universities is the mandatory consideration of such a characteristic of modern science as its openness. Science as an important component of an open society allows creating an environment for interaction between civil society and institutions engaged in research activities (Vinichenko et al., 2021). According to the authors of the article, the openness of university science will allow achieving a qualitatively new level of international cooperation for Russian institutions of higher education.

*Literature review*

The relevance of management in higher education is emphasized by K.J. Kennedy (2003), who defines precisely the management of the key problem of the 21st century.

The relevance of the management of research activities is stated in (Agyemang & Broadbent, 2015). Researchers see a direct impact of university management on the indicators in the Shanghai Ranking of research-related universities. The authors (Agyemang & Broadbent, 2015) justify their position by the fact that management is a mechanism for implementing autonomy, namely, autonomy and competition increase the effectiveness of research at universities. The conclusion about the relationship between the management of research activities and the level of research in the work is confirmed (Hobson & Shaver, 2005).

M. Mintrom (2008) believes that the management of research activities assumes that both external stakeholders (representatives of employers, the national association of students) and internal stakeholders (the academic council) are involved in it. The role of external stakeholders in the management of research activities of universities, as noted by G. Keczer (2012), grows from advisory to full-fledged in the decision-making process.

Speaking about university research management, researchers (de Boer, Enders, & Schimank, 2007) have identified four aspects of it: stakeholder leadership, academic self-government, managerial self-government, and competition for limited resources. The authors (Frost, Hattke, & Reihlen, 2016; Pilniok, 2015) note that the most important component of modern research management processes is trust, which means reliable relations between various stakeholders in the organization.

Even though, according to researchers (Logachev, Orekhovskaya, Seregina, Shishov, & Volvak, 2021; Udaltsova, 2021), there is a relationship between the quality of research at universities and the management of research activities, the issues of revealing the essence of research activity management and the principles of its implementation in an open science remain insufficiently investigated in science.

A. Grand, C. Wilkinson, K. Bultitude, and A. F. Winfield (2012) proposed to consider the concept of «open science» as transparent and accessible knowledge, which is exchanged and with the help of which it is developed through common networks. The openness of science, according to researchers (Altunay et al., 2010), will make it effective, reliable and responsive to public challenges. P. Mirowski (2018) focuses on the desire for open science to bridge the gap between science and society by democratizing scientific knowledge. The conceptual ideas about Open innovations and open science are contained in a document of the European Commission, and since 2016-2018, the concept of OpenScience («open science») has been approved in leading European countries (Heise & Pearce, 2020; Krishna, 2020). Thus, the key idea that the OpenScience concept implements is the responsibility of science to society. OpenScience, as a science with and for society, should play an important role in solving social problems (Kraker, Leony, Reinhardt, & Beham, 2011).

The main tools for implementing the OpenScience concept are open access to scientific publications (Molloy, 2011), open research data (Marcus-Quinn & Diggins, 2013), open discussion of the scientific research process and its results (Tacke, 2010).

The realization of the OpenScience concept requires the implementation of several steps, including, in particular: appropriate data management models, compatible

standards, agreements on sustainable data exchange with the participation of the public sector, the private sector, and civil society; incentives for researchers; sustainable infrastructures, existing human and institutional capabilities and mechanisms (Ferrari, Scardaci, & Andreozzi, 2018). Therewith, universities should become one of the main subjects responsible for the development and implementation of the policy of openness in science (Ogungbeni, Obiamalu, Ssemambo, & Bazibu, 2016).

Research hypothesis: the management of research activities at the university in the OpenScience concept requires the achievement of key standards in specific areas of the university's activities and must comply with certain principles of research management.

*Research objectives:*

1. to identify the areas of research activity management and the basic principles of research activity management based on an expert survey;

2. to identify the basic digital tools that are used to implement the management of research activities in OpenScience (to meet the internal needs of the university).

The article consists of an introduction, a literature review, methods, results, discussion, and conclusion.

## MATERIALS AND METHODS

*Research design*

A mixed type of research design was used to prove the hypothesis based on a combination of requirements for data collection and analysis necessary for the implementation of the research goal. Therefore, the following methods were chosen to obtain information:

- analysis of scientific literature using methods of analysis, synthesis, comparison, and generalization – to study the state of the research problem;

- the expert survey method – to determine the areas of research activity management, the basic principles of research activity management, as well as the basic digital tools that are used to implement research activity management in OpenScience;

- ranking method – to determine the rank of the research activity management principle.

*The procedure, research tools*

The sources of information necessary for the implementation of the research goal were selected at the first stage of the research: articles published in journals indexed by Scopus and Web of Science (14 sources), speeches at scientific conferences (3 sources), collective monographs (5 sources) containing information on the management of research activities at universities, as well as the main provisions of the OpenScience concept.

The areas of research activity management, the basic principles of research activity management, as well as basic digital tools that are used to implement research activity management in OpenScience were identified at the second stage of the study, based on an expert survey in the audio/video communication mode (WhatsApp). Several basic digital tools for managing research activities in OpenScience to meet the internal needs of the university were proposed for consideration by experts (Table 1).

Table 1. Basic digital tools for implementing research activity management in OpenScience.

| Types of activities | Digital tools |
| --- | --- |
| Organization of cooperation, in the particular international one | Google Drive, OneDrive Microsoft, Teams Microsoft |
| Preparation of articles, abstracts, reports | Word (Google Docs, Office 365) |
| Academic Virtue | Advego Plagiatus, UNICHEK, Anti-plagiarism eTXT |
| Cooperation on regulatory documents, letters, orders (commenting, making edits, discussion) | Word (Google Docs, Office 365), Skype, ZOOM, Google Meet, Teams Microsoft |
| Preparation of scientific reports on the results of scientific research (development of documents, tables, comments, making edits, layout, discussion, forwarding) | Word, Excel (Google Docs, Office 365), Google Drive, OneDrive, Forms, ZOOM, Google Meet, Skype, WebEx, e-mail |
| Publication of the results | Websites, boards, round tables, conferences, in particular, international and online ones (ZOOM, Google Meet, Skype) |
| Preparation of reviews, expert opinions, reviews (development of documents, commenting, discussion, forwarding) | Forms, Word (Google Docs, Office 365), ZOOM, Google Meet, Skype, WebEx, email |
| Monitoring of scientific activity of employees | Internet: Google Academy, Publons ID, Scopus ID |
| Instant communication, notification | Viber, WhatsApp, Telegram, e-mail |

| Specific digital tools for researching in the context of branches of science ("other") | OpenScience Cloud Services |
|---|---|

The selection criteria for experts (22 people) were the availability of at least 3 articles on this topic published in journals included in the Scopus or Web of Science citation bases or at least 10 years of teaching experience in higher educational institutions.

The analysis of the collected information was carried out at the third stage of the study, with the interpretation of the results obtained.

*Statistical analysis*

The study used numerical calculation methods using the Microsoft Excel software product, which was used to calculate the percentage of expert mentions of the basic principles of research management, as well as the use of certain basic digital tools for implementing research management in OpenScience.

## RESULTS AND DISCUSSION

The conducted expert survey showed that the management of research activities requires the achievement of key standards in the following areas (Table 2).

Table 2. Areas of research activity management

| No. | Management spheres | Key standards |
|---|---|---|
| 1 | ethics | ensuring the dignity, rights, safety, and well-being of the study participants |
| 2 | science | providing design topics, methods, and research based on an independent review of experts in the relevant field |
| 3 | information | ensuring effective dissemination of research results and full public access to information on research issues and it's conclusions |
| 4 | health and safety | ensuring the protection of the safety of research participants at any time; the most important thing is also taking care of the environment when conducting research |
| 5 | legal issues | ensuring compliance with the legislation when conducting research |
| 6 | finance | ensuring financial fairness |
| 7 | academic virtue | prevention of fraud and abuse in research |

Note: compiled based on the expert survey

Therewith, the main principles of implementing the management of research activities, according to experts, are the following (Table 3).

Table 3. Basic principles of research activity management

| No. | Management principles | Characteristics | %* | Rank |
|---|---|---|---|---|
| 1 | integrity principle | compliance by researchers with ethical requirements when researching to ensure confidence in their results | 82% | 1 |
| 2 | responsibility principle | ensuring compliance of research with concluded agreements and deadlines, accountability to professional bodies in the field of research | 77% | 2 |
| 3 | monitoring principle | systematic evaluation of research results for conducting current analysis and directing the process to achieve the goal | 73% | 3 |
| 4 | openness principle | informing and widely involving the public in the supervision of research results | 68% | 4 |
| 5 | cooperation principle | facilitating the open exchange of ideas, research methods, data, and survey results with other researchers and institutions | 64% | 5 |
| 6 | the principle of continuous development of researchers | providing opportunities for the development of researchers to conduct their research | 59% | 6 |

Note: compiled based on an expert survey; * – percentage of expert mentions

It should be noted that such principles of research activity as openness and cooperation fully correspond to the OpenScience concept which is actively being implemented in the research space.

According to the results of a survey concerning the use of basic digital tools for the implementation of research management in an open science environment (to meet the internal needs of the university) (Table 1), we found that the following digital tools are most often used to implement the management of research activities at universities (Table 4).

Table 4. The results of the survey on the use of basic digital tools for the implementation of research management in OpenScience

| Types of activities | Survey results |
|---|---|
| Organization of cooperation, in the particular international one | e-mail – 82%, Google Drive – 68% |
| Preparation of articles, abstracts, reports | Word – 82%, e-mail – 59%; |
| Academic Virtue | Anti-plagiarism eTXT – 64%; |
| Cooperation on regulatory documents, letters, orders (commenting, making edits, discussion) | Zoom – 64%, e-mail – 64%, Word – 59% |
| Preparation of scientific reports on the results of scientific research (development of documents, tables, comments, making edits, layout, discussion, forwarding) | Word – 68%, Excel – 64%, e-mail – 64% |
| Publication of the results | conferences of the international level – 91%, the website of the institution – 86%, conferences of the all-Russian level – 73% |
| Preparation of reviews, expert opinions, reviews (development of documents, commenting, discussion, forwarding) | Word – 77%, Google Docs – 36%, e-mail – 27%, Zoom – 27% |
| Monitoring of scientific activity of employees | Google Academy – 95%, Scopus ID – 59% |
| Instant communication, notification | WhatsApp – 86%, e-mail – 91%. |
| Specific digital tools for researching in the context of branches of science ("other") | - |

Note: compiled based on the expert survey

We analyzed the environment of the «open science» cloud (https://www.eosc-portal.eu/), and found that to ensure the implementation of the five main priorities, scholars were offered 263 services in 8 categories: «network», «computing», «storage», «access», «data management», «processing and analysis», «security», «training and support» in the context of such branches of sciences as: interdisciplinary, humanitarian, social, natural, technical and technological, medical, agricultural, auxiliary.

The most opportunities for implementing the principles of open science are offered for the branch of natural sciences – 91 services, and for the branch of «Educational Sciences» only 6 – «computing», «data management», «storage», «shared access», «processing and analysis». For example, public access services are offered for the «Educational Sciences» industry, in particular the following: Hypotheses – a service for testing hypotheses, Europeana – a service for managing digital cultural heritage, Aila – a data service, a social sciences data archive, Certified DOAB – certification of open access monographs. The open science cloud takes into account the specifics of the branches of science, digital systems are created to support the research of various complexity.

The analysis of the scientific literature and the results of the expert survey (Tables 2, 3) allowed us to propose a definition of the «management of research activities at the university» concept and to identify the key values on which it should be carried out. We consider the management of research activities at the university as management aimed at ensuring the excellence of research by developing a research strategy with a clear definition of goals, priorities, and mechanisms; implementing internal policies to create an environment in which high scientific and ethical standards are adhered to when performing research; broad involvement of external and internal stakeholders; monitoring the effectiveness of research and broad public access to the supervision of their results; transparency of management decisions, which is implemented based on a balance between independence and accountability, trust and control, efficiency and quality. The values of research management are trust, partnership, broad involvement, openness, transparency.

Therewith, digital tools play an important role in the organization of research activity management. Thus, in the context of the COVID-19 pandemic, the heads of structural divisions of universities faced the question of selecting and using digital tools to ensure the continuity and regularity of scientific research (Krishna, 2020). For such work, structural divisions of universities have the opportunity to use a system of free digital tools for various types of scientific activities. Virtual offices that can be organized using Google Drive, Microsoft OneDrive, Microsoft Teams, and used for organizing research management are becoming widespread (Tacke, 2010).

Unfortunately, respondents from any university did not mention platforms or digital tools of open science in the «other» items (see Table 4), which requires additional clarification, dissemination of information about the effectiveness of such tools, and the organization of training on their use. We believe that assessing the state

of remote control today, it is gradually only entering into the usual practice in Russia. In this regard, the role of the teacher, his/her level of readiness for conducting classes in an online format increase. The need for information literacy of university staff and continuous professional development in the field of digitalization of education is becoming more urgent than ever. The analysis of the current situation shown in the studies of E.M. Dzyuba and others (Samoylova, Komyshkova, Ilchenko, & Marinina, 2021; Udaltsova, 2021) allows concluding that the practice of education in the environment of foreigners is largely becoming rethought and the mechanisms of adaptation to new conditions of the educational environment are gradually included.

Thus, the management of research activities in terms of «open science» becomes difficult, responsible, controlled, has signs of globalization processes of research, as evidenced by the findings of the study (Frost et al., 2016), which proposed three characteristics of management research in higher education – multi-level, multi-actor and multi-issue. Therewith, M. Mintrom (2008) believes that the fourth component – multi-procedures should be added to the above three components of management. Based on the definition of the concept of «procedures» as an officially established or generally accepted procedure for the implementation, execution, or registration of something (Bleiklie & Kogan, 2007), we suggest that the procedure for managing research activities should be understood as a documented description of sequential actions (indicating those responsible) for managing research activities at the university. The multi-procedure nature of research activity management is considered as the presence of several clearly defined formalized procedures on the procedure for implementing actions related to compliance with high scientific and ethical standards when performing research, transparency, and accountability of management activities; attracting both internal and external stakeholders; ensuring broad public access to monitoring research results.

It is the development and use of many clearly defined procedures for the implementation of the management of research activities at universities that will allow finding a balance between the system of values of members of the academic community and the system of interests of all interested parties.

## CONCLUSIONS

We have established the compliance of the principles of research activity management (openness and cooperation) with the OpenScience concept, the implementation of

which in universities meets the needs of improving the quality of higher education and the research space.

Thus, the results of the study confirmed the hypothesis that the management of research activities at the university in the OpenScience concept requires the achievement of key standards in specific areas of the university's activities and shall comply with certain principles of research management

Given the need to ensure a qualitatively new level of international cooperation in the scientific industry, we consider it relevant to develop and use institutional research management policies at universities aimed at improving the quality of research and implementing the key ideas of the OpenScience concept.

We see the prospects for further research in the development of theoretical and practical foundations for increasing the research potential of Russian universities in the context of the implementation of the OpenScience concept, the development of a scientifically based model for managing research activities at universities.

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