

## CHAPTER 2

# INNOVATIONS IN THE MANAGEMENT OF EDUCATIONAL INSTITUTIONS

### APPLICATION OF MODERN INFORMATION SYSTEMS AND TECHNOLOGIES IN SCIENTIFIC ACTIVITY

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**Abstract.** *The development of a single information space with the intensive introduction of information systems has led to the rapid accumulation of information resources, the bulk of which are publications of research results. In modern society, the most important result is the result of scientific research, not just the process of activity or thought. As the number of scientists increases, the question of the scientific contribution of each of them arises. The weight of a scientist in the scientific community, his influence on events in his chosen field of science, is now largely determined by how fully, constructively and organically presented the results of his research on the Internet. It is difficult to evaluate scientific activity with only one parameter, especially since there is a need to evaluate using quantitative and qualitative indicators. This is due to many problems, the main of which is to take into account the quality of scientific work and interpretation of indicators in the numerical dimension, which allows to obtain important information about the relevance of a particular topic and vice versa. It is important to remember that international open access scientometric platforms are a powerful non-profit tool for disseminating, publishing and analyzing the use of research results. They provide an opportunity not only for quality evaluation of scientific information, but also for close cooperation between scientists around the world. Scientometric calculations in such systems allow to determine important citation rates and statistics of scientific activity of researchers. The article highlights the problem of using international scientometric databases in research activities as web-oriented resources and services that are a means of publishing and disseminating research results. The basic concepts of the problems of using open digital systems for the evaluation of scientific research are systematized. Functionalities and tools of scientometric databases are investigated. An overview of the most popular open access scientometric databases. The advantages of using international scientometric databases and social scientific profiles in conducting research and their prospects, which are the allocation of cloud information and analytical services of this system.*

**Keywords:** *informative systems, technologies, scientific activity, open and the closed access, scientifically metrical database*

**JEL Classification:** *O 30, O 31, O 32, O 33, M 14*

**Formulas:** *0; fig.: 1; tabl.1; bibl.: 17*

**Introduction.** It is difficult to evaluate scientific activity with only one parameter, especially since there is a need to evaluate using quantitative and qualitative indicators. This is due to many problems, the main of which is to take into account the quality of scientific work and interpretation of indicators in the numerical dimension, which

allows to obtain important information about the relevance of a particular topic and vice versa.

There is a problem of using web-oriented resources and services as a means of implementing the results of scientific research, in particular their publication and dissemination. This ensures, firstly, the publication of products based on the results of scientific research and access to it by Internet users, and, secondly, automates the processes of collecting, processing and submitting data on the quantitative and qualitative characteristics of such publication.

**Literature review.** The use of international scientometric databases in scientific activities is considered by domestic (O.R. Garasim, V.D. Ageev, D.O. Tarasov, G.O. Oborsky, A.A. Biloshitsky, V.N. Burkov, V.D. Gogunsky, O.M. Spirin, L.Y. Kostenko, V.M. Bykov) and foreign scientists (E.Z. Suleimenov, V.A. Frolova, D. Nicholas, V.M. Vasilieva, S.D. Khaitun, A.N. Leontiev, J. Bar-Ilan, R. Price, J. Kaur, D. Lupton,), and others.

Access to the publications of the world community of scientists opens new opportunities for the analysis of the scientific level of research. Citation of scientific works by scientists is an assessment of the quality and significance for science and practice of the results.

**Aims.** The aim of the article are the detailed analysis and ground of directions of the use of the modern informative systems and technologies in scientific activity.

**Methods.** For the decision of this aim such methods of research were used: supervision and generalization; organization of all basic elements; method of scientific generalization, that gave an opportunity to set forth conclusions.

**Results.** In modern society most ponderable is a result, that gives scientific research, but not only process of activity or idea. With the increase of amount of scientific a question appears about a scientific deposit each of them. Weight of scientist is in a scientific concord, his influence on events that take place in the select by him area of science, presently in a great deal determined by that, as far as full, structurally and the organically presented results of his researches in an Internet-network [1].

In particular this was reflected in various documents of the Ministry of Education and Science of Ukraine, which strengthened the requirements for obtaining degrees and academic titles based on the availability of publications in foreign and domestic journals indexed on Scopus and Web of Science platforms. Therefore, creating your own profile in reputable specialized scientific services and its optimization will help the researcher to effectively present their own scientific publications, find new colleagues, open new opportunities for research funding and improve their scientometric performance. At the same time, the effective presentation of preliminary research results by the scientist and his communication with foreign colleagues and partners becomes very important. An effective solution in solving this problem is the use of modern information and communication technologies and in particular specialized information services for scientists on the Internet [2].

Search and information capabilities of the system allow:

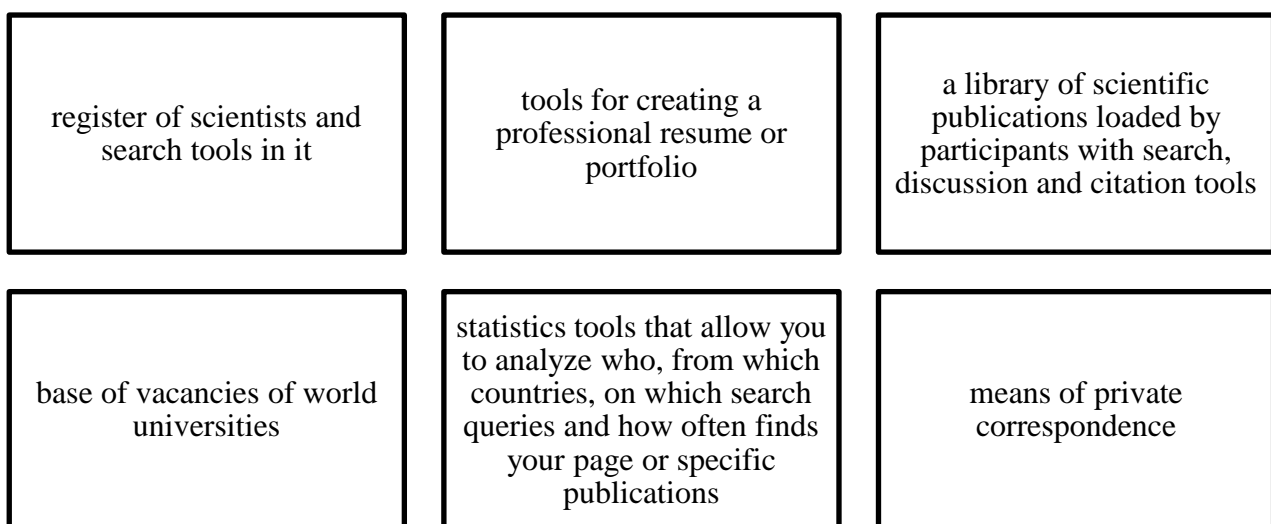
- look for colleagues involved in the relevant field of research;

- select lists of scientists by place of work, place of defense of the dissertation, institution, department, city;
- view the list of publications of the scientist: abstracts, dissertations, books, scientific articles;
- download available full texts of scientific publications;
- receive information on available information sources of reference and biographical nature;
- to determine the range of scientists connected by scientific and family ties;
- view information of bibliometric profiles of scientists;
- use the automatically created list of co-authors [3].

In addition, creating your own profile in reputable specialized scientific services and its optimization will help the scientist to effectively present their own scientific publications, find new colleagues, open new opportunities for research funding and improve their scientometric performance. We can say that a scientist should advertise his achievements. Also, when trying to get grants for research, conferences, internships or for re-certification in addition to CV (summary) and a list of publications, it is sometimes necessary to indicate your Scientific ID, H-index, etc. Such information should be always up to date with the scientist [4].

The so-called author identifier (ID) is a unique identifier used to identify a scientist, given that researchers have the same or similar surnames and names, and to combine all the scientist's publications and research with the scientist's own profile in databases. or in scientific social networks.

Most networks for scientists include various functionalities and tools (Figure 1).



**Figure 1. Functionalities and tools of scientometric databases**

Source: compiled by the author on the basis [5-6]

At the same time, on the basis of the analysis of scientific, methodical literature, normative documents the basic terms and concepts concerning a problem of use of open digital systems for an estimation of scientific researches have been allocated (Table 1).

**Table 1. Basic concepts of the problems of using open digital systems for the evaluation of scientific research**

Concept	Brief description
Open access	free, fast, constant, full-text real-time access to scientific and educational materials, which is implemented for any user of the global information network, carried out mainly to peer-reviewed research journals and institutional repositories.
Scientometric database	bibliographic and abstract database containing tools for tracking citations of scientific publications. Such databases are search engines that generate statistics to determine the status and dynamics of demand, activity and impact indices of individual scientists and research organizations.
Citation index	a quantitative indicator that indicates the impact of individual scientists or research teams on certain scientific fields, given the quantitative characteristics of the use of research results.
Monitoring the implementation of scientific results	collection, processing and submission of information on quantitative and qualitative indicators of the course of implementation and the volume and nature of implementation of products of scientific institutions (scientific, research and production, training, reference, electronic resources, etc.) are provided.
Information and analytical support of scientific research	assistance and assistance to the subjects of research activity in obtaining and analytical processing of information and data on the processes of planning, organization, conducting and implementation of research results by means of information technologies.

Source: compiled by the author on the basis [7-10]

There are various specialized scientific services in which a scientist can create his own profile. Creating a profile of a scientist depends only on free time and the desire to disseminate information about their own scientific achievements in the national and international scientific and information space.

Today, the Scopus database platform is positioned by Elsevier as the largest platform with more than 24,000 scientific publications. It should be noted that these platforms are not the only scientometric bases of peer-reviewed scientific literature. The Google Scholar system is widely used on the Google Network platform. Less popular is the scientometric database created in 1999 in Poland, Index Copernicus. In Ukraine, there are also some attempts to introduce accounting for scientific activities through citations of scientists, in particular, the database "Bibliometrics of Ukrainian Science" is being formed. Thus, in the world market there is some competition between scientometric databases with peer-reviewed scientific literature.

It is advisable to consider the most common and authoritative scientific services with which you can create your own profile:

- *Scopus Author ID* - the author's identifier, which is automatically assigned to the researcher when his publications appear in publications indexed in the Scopus scientometric database. Given the automatic creation of the profile, there is a need for personal editing and making changes to the profile, which can be done regularly without even having a special subscription to the Scopus database [11].

It is a bibliographic and abstract database and a tool for tracking citations of articles published in scientific journals. Is one of the components of the integrated scientific and information environment SciVerse. For authors who have published more than one article, Scopus creates individual accounts - author profiles with unique Author IDs (with one publication, profiles are also created but hidden). These profiles provide information such as author's name options, list of places, number of publications, years of publication, research areas, references to major co-authors, total citations to the author's publications, total number of sources cited by the author, Worst author index etc. The database allows users to use unique author IDs to generate search queries and set up notifications (email or RSS) about changes in author profiles.

In many countries, the Scopus database is one of the main sources of scientometric data for evaluation research at the state and / or corporate level.

- *Researcher ID* - a register of unique identifiers of scientists from Clarivate Analytics (developer of the Web of Science platform). Some journals require this number to be provided when submitting an article for further correct indexing by the author. The free add-on from Clarivate Analytics allows the author to compile their publications and evaluate their citations on the basis of Web of Science, even if these articles have not been published in publications indexed by Web Of Science. It is possible to add publications to the profile via EndNote or ORCID. From 2019, ResearcherID and Publons profiles have been merged into a single account to take full advantage of Web of Science [12].

This unique identifier is aimed at solving the problem of author identification. Scientific publications often indicate the name, surname and initials of the authors of the article. Sometimes, however, there are authors with the same name, with the same initials, or the name printed in the journal may contain an error that leads to several spellings of the name of one author, or the same spelling of the name and surname of different authors.

On the website of the database, authors have the opportunity to link their articles to their own profile. Thanks to this, in particular, they can also keep their list of publications up to date and online. Thus, it is possible to create an exhaustive list of the author's work, as not all publications are indexed in the Web of Science database.

The combined use of ResearcherID and Digital Object Identifier by the researcher allows to obtain a unique association of authors and scientific articles. ResearcherID can be used to link researchers to registered clinical trials, or to search for colleagues and staff in a specific field of research.

- *ORCID (Open Researcher and Contributor ID)* - the only open, international, multidisciplinary register of unique identifiers of researchers. Provides free access to the profiles of scientists and transparently represents their research activities. The 16-digit ORCID number is a link to the online CV (resume) of the scientist, which must be indicated for the correct identification of the scientist when applying for grant funding, articles, etc [13].

ORCID is unique due to its independence from scientific disciplines and national borders, as well as a well-established system of interaction with other identification systems (eg scopus). ORCID-identification of scientists also allows to solve the

problem of conscious or accidental use of homoglyphs in writing the names of scientists. No information about the person is encoded in the ORCID number. These identifiers have been designed to be useful in situations where personal information should not and cannot be publicly available. In addition, the identifier is intended for long-term use, all information that may change during a person's career can be properly edited and edited by the user.

- *Google Scholar* - is a non-profit specialized search engine that indexes scientific publications and provides citation data. The Google Scholar profile is part of the Google search engine. This search platform indexes the full text of scientific publications of all formats and disciplines, allows authors to monitor citations of their own publications or citations of a particular author, follow a specific topic, see your coefficient of Hirsch, and more. The profile can be closed (accessible only to the owner) and open (then it will be displayed in the search by person's name). If the profile is open and linked to the author's university address, such a profile is taken into account when determining the ranking of universities by the citation index (Webometrics). The author's publishing activity is most widely represented in Google Scholar [14].

Creating your own Google Scholar profile allows authors to keep track of bibliographic references to their articles. You can view who cites publications, view citation graphs over time, and calculate several scientometric metrics. In addition, the names of researchers with a verified Google Scholar profile are highlighted in the search results as hyperlinks. Articles in publications not presented on the Internet and not indexed by Google Scholar can be submitted manually (subject to identification of the scientist and registration by e-mail at a scientific institution or educational institution).

Google Scholar provides both simple and advanced searches for academic literature across many disciplines and sources, including peer-reviewed articles, dissertations, books, annotations, and articles published by academic journals, professional associations, universities, and educational organizations. In addition, it shows the best results in the ability to search for citations, as some of them are placed in patents, conference proceedings, books, ie in documents that are poorly represented in the largest scientometric databases. This allows you to find the research that best meets the demand, among the large number of academic research papers. Like Google's universal search engine, specialized Google Scholar informs the user of the title, snippet and hyperlink to the document.

In addition to scientific identifiers, it is possible to maintain scientific profiles in scientific networks (Academia, Figshare, ResearchGate and others):

- *ResearchGate* - is a free social network, an information platform for the scientific community and a tool for collaboration between scientists from different scientific fields. This is a scientific network that can be registered only from a university or business address. In it, the authors inform about their publications - with or without the text, projects, etc. The system allows you to follow certain authors or specific scientific topics (research interests). A feature of this network is the ability to ask a public question and get an answer from colleagues. The system generates its own

Hirsch coefficient, ranks scientists, in particular, according to the statistics of viewing within the educational institution [15].

- *Figshare* - a platform for the accumulation of scientific, academic texts. It can store both drafts and working materials (in a closed format, accessible only to the owner), and published works in the public domain. It is possible to see how many readers were in the publication [16].

- *Academia* - is a scientific network where anyone can register. It allows you to teach any published and unpublished works, presentations, lecture texts or something, follow certain authors or specific scientific topics (research interests). If the author submits a full-text file, it is available for download by readers. An important function of this scientific network can be considered the discussion of a draft of the manuscript with a closed group or certain persons, the ability to communicate directly with a particular author. Currently, about 150,000 scientific articles are uploaded to the site every month. The number of registered users is more than 30 million [17].

**Discussion.** The above-mentioned profiles and social networks are useful for universities, as they allow you to track information on research and teaching staff, to generate reports on research activities. For libraries, the cataloging process by authors is simplified. Grant organizations have the opportunity to see a list of publications by a particular author and the grants they have received. Scientific communities can see the publishing activity of their members or potential conference participants.

Research shows that texts published in scientific networks may have a higher level of citations, although some scholars question the impact of online profiles on the use of scientific documents and the quality of citations.

However, the effective use of new online opportunities by researchers helps to promote the results of research and higher education institutions. Moreover, the use of Internet tools by scientists has led to the development of new areas of knowledge, including webometry, which studies information resources using bibliometric and infometric approaches.

**Conclusion.** The impact of new information technologies on modern life society is significant and multifaceted. The Internet continues to have a significant impact on the nature of mass communication, on the one hand, increasing the availability of dissemination channels, providing scientists with great opportunities to disseminate scientific and popular science content, on the other - creating conditions for high competition for readers. science. If science wants to maintain its authority and be a significant factor in public life, it is necessary to look for new and effective forms of popularization of science, in particular, Ukrainian scientists should actively use new online and free means of scientific communication, especially new social media, which significantly expand the audience of popular science materials.

Thus, scientific profiles and academic networks are not only a practice of publishing houses and a requirement of certain organizations, but also promote the development of scientists, provide them with up-to-date information about the work of colleagues, provide feedback and scientific advice. At the same time, international open access scientometric platforms are a powerful non-profit tool for disseminating, publishing and analyzing the use of research results. They provide an opportunity not

only for quality evaluation of scientific information, but also for close cooperation between scientists around the world. Scientometric calculations in such systems allow to determine important citation rates and statistics of scientific activity of researchers.

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