

Analysis of Research Activities of University Teachers as Part of the Education Quality Assurance System

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Keywords: Publishing Activity, Scientist Profile, Scientometric Databases, Transparency Rating, Rating System, Research Activity, Quality Assurance of Education.

Abstract: The rapid development of digital technologies is changing the role of the university in the digital society. An important aspect of increasing the level of competitiveness of the university in the market of educational services is to ensure the quality of results of all higher education institution activities, especially research, so to analyze the university is important to develop and implement internal university rankings. The article analyzes the international and Ukrainian experience of presenting the results of research activities of university teachers to ensure the quality of education, ways to design systems for analyzing research activities of teachers, tools and components for evaluating the effectiveness of research. The model and stages of designing a rating system for evaluating research activities of teachers are described, which allows for systematic monitoring of openness, transparency, and efficiency of the research component of teachers' professional activities. The key indicators for evaluating the effectiveness of scientific research are identified – citation indicators of the three most important scientometric databases – Scopus, Web of Science, Google Scholar: number of publications, number of bibliographic references, h-index, i10-index. The article presents one of the stages of the model implementation, namely the development of transparency rating by citation indicators in Google Scholar. According to the results of the study, the positive impact of the rating system is identified, the main measures to increase visibility, presence, dissemination of research results are identified, the systematic implementation of which provides effective representation of the scientist in domestic and international rankings.

1 INTRODUCTION

The main priority of each university is to provide quality educational services and increase competitiveness to attract the most promising applicants for education. The rapid development of digital technologies is leading to the transformation of education, changing the role of the university in the digital society. The influence and authority of the university in the European Higher Education Area is significantly influenced by the openness and transparency of all activities. Key areas of educational transformation for global sustainability were discussed at the UNESCO World Higher Education Conference, which include cooperation and diversity, interdisciplinarity, flexible approaches to lifelong learning and knowledge that meet today's societal needs, support for research, etc.

(WHEC, 2022). Therefore, an important aspect of increasing the level of competitiveness of the university in the market of educational services is to ensure the quality of results of all types of educational activities of higher education institution, especially scientific.

The defining documents regulating the functioning of the internal quality assurance system of higher education at the university are the requirements of the Laws of Ukraine “On Higher Education”, “On Education” and Standards and Recommendations for Quality Assurance in the European Higher Education Area (ESG 2015). According to the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ENQA, 2015), the key aspects of quality assurance in education are: internal and external quality assurance systems of education and quality assurance institutions. The main components of the university's internal quality assurance system include the introduction of internal regulations on the implementation of education quality assurance policy, periodic review and improvement

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of educational programs in accordance with modern labor market needs and state standards, changing paradigms of higher education, including student-centered teaching and learning, monitoring the level of professional competence of teaching staff and creating conditions for continuous professional development and improvement of teachers, availability of educational resources, transparent enrollment procedures, achievements, certification of students based on learning outcomes, introduction of effective information management technologies, transparent coverage of accurate, objective, accessible information in the public domain on various aspects of university, periodic external monitoring of quality assurance. An important component of the internal quality assurance system of education is to increase the openness of university, ensuring transparent evaluation of teachers' professional activities, open access to results, professional and scientific achievements.

One of the tools for measuring the competitiveness of the university is its participation in international and domestic educational rankings. To ensure a complete and objective assessment of the methodology of the most authoritative rankings are based on indicators covering various areas of university activity. Such key indicators are indicators of academic reputation and reputation among employers; teaching quality indicators – the ratio of teachers and students, PhD and academic staff, etc.; indicators of the quality of scientific research – the number of publications and citations in publications included in influential scientometric databases; indicators of international cooperation – the percentage of foreign students and teachers; indicators of visibility and influence of sites, etc. The quality and transparency of research activities of universities is assessed by indicators of publishing activity of teachers. Indicators of the quality of scientific citations according to Google Scholar citations and citations in influential scientific journals are taken into account in international rankings – “Academic Ranking of World Universities” (ARWU), “QS Top University Ranking”, webometric ranking of world universities “Webometrics”, “Transparent ranking: Top Universities by Google Scholar Citations” and Ukrainian ones – “University rankings according to Scopus indicators”, “Top-200 Ukraine”, “Consolidated rating of higher education institutions of Ukraine”, “Bibliometrics of Ukrainian science” (Buinytska et al., 2018). Comparison of the weight of research indicators in the methodologies of the most authoritative ratings are presented in table 1.

Periodic monitoring of methodologies and key indicators of the most influential ratings is important for the analysis of the effectiveness of the univer-

sity's performance in the rankings. An effective tool for analyzing university performance is the introduction of internal university rankings. For a comprehensive and complete assessment, it is important that the methodologies of internal university rankings are based on key performance indicators that are taken into account in the methodologies of the most authoritative international and Ukrainian educational rankings. Therefore, to ensure optimal presentation of the research component of the university in the rankings and ensure openness, transparency of the university, it is necessary to develop and implement a rating system for evaluating the research activities of teachers to monitor the effectiveness of research activities and create an appropriate system to increase its openness, transparency international scientific networking communities in order to promote and communicate.

The *purpose* of the study is to develop a rating assessment of research activities of university teachers as part of the internal system of quality assurance of education for openness and transparency of the university.

2 RESEARCH OF THE EXPERIENCE OF THE ANALYSIS OF RESEARCH ACTIVITY OF TEACHERS IN THE EUROPEAN SPACE OF HIGHER EDUCATION

Delgado López-Cózar et al. (Delgado López-Cózar et al., 2019), Martín-Martín et al. (Martín-Martín et al., 2018b), Bykov and Spirin (Bykov and Spirin, 2016), Bykov et al. (Bykov et al., 2020), Semerikov et al. (Semerikov et al., 2018), Kuzminska et al. (Kuzminska et al., 2022), Vakarenko (Vakarenko, 2018) studied the features of the analysis of research results using open scientometric and bibliometric systems.

Theoretical bases of rating estimation of activity of teachers of universities of Ukraine are described in (Dzoba, 2019; Reheilo, 2020; Yaroshenko, 2020). Reheilo (Reheilo, 2020) identified the basic conceptual principles of evaluating the effectiveness of research activities of teachers, identified the principles, structural components and indicators of evaluation of research activities of teachers in the European Higher Education Area. Yaroshenko (Yaroshenko, 2020) emphasized the need to modernize indicators of research activities of teachers, in accordance with the modern realities of university education, summarized the

Table 1: Comparative table of the weight of research indicators in the methodologies of the most authoritative ratings.

Rating name	The weight of research indicators
Academic Ranking of World Universities	60%
QS Top University Ranking	20%
Webometrics	50%
Transparent ranking: Top Universities by Google Scholar Citations	100%
University rankings according to Scopus indicators	100%
Top-200 Ukraine	40%
Consolidated rating of higher education institutions of Ukraine	45%
Bibliometrics of Ukrainian science	100%

main characteristics of rating evaluation of teachers: goals, objectives, functions, principles of ranking.

Kostenko et al. (Kostenko et al., 2019), Shynenko et al. (Shynenko et al., 2021), Gasparyan et al. (Gasparyan et al., 2018) presented features of quality assessment of research results.

Bykov et al. (Bykov et al., 2021), Tkachuk et al. (Tkachuk et al., 2017), Morze et al. (Morze et al., 2022a), Morze and Buinytska (Morze and Buinytska, 2017), Buinytska (Buinytska, 2021) considered the evaluation of the results of research activities of teachers to increase the competitiveness of the university in general and the results of the participation of universities in international and Ukrainian rankings.

The use by scientists their profiles in Google Scholar, ORCID, Mendeley, Academia, ResearchGate increases the visibility of publications in the information space and has a positive effect on increasing citation rates, as noted in (Hohunskyi et al., 2016).

Nazarovets (Nazarovets, 2019) investigated the search engine and database of scientific citations, which contains metadata of all publications that use the Cited-by service from Crossref and support the Initiative for Open Citations – Open Ukrainian Citation Index (OUCI), developed by the State Research Technical Library of Ukraine (OUCI, 2021). The OUCI database contains metadata of scientific publications that receive DOI from Crossref and takes into account citations between scientific publications. OUCI is designed to simplify the search and analysis of research results and expand the presentation of information about Ukrainian scientific publications in international search engines such as Dimensions, Lens.org, 1findr, Scilit, etc. The implemented analytical tool allows to assess the state and dynamics of development of scientific potential of scientific institutions and researchers in terms of fields of knowledge, years, to select appropriate scientific journals for publication.

In (Kostenko et al., 2019) the information-analytical system “Bibliometrics of Ukrainian Sci-

ence”, developed by the Social communication research center, which is a single register of bibliometric profiles of researchers and research teams in the most authoritative scientometric databases Scopus, Web of Science and Google Scholar system. The system allows to analyze the domestic scientific potential, to carry out a comparative analysis of the effectiveness of research activities of Ukrainian scientists in the fields of knowledge, cities, affiliation, agencies, etc. by building rankings on the value of h-index in Scopus, Web of Science or Google Scholar (Bibliometrics, 2022). The presentation of a scientist in the “Bibliometrics of Ukrainian Science” is a passport of a scientist in the educational space, which reflects his authority and influence on the development of a particular scientific field.

3 INTERNATIONAL AND UKRAINIAN EXPERIENCE IN PRESENTING THE RESULTS OF TEACHERS’ RESEARCH ACTIVITIES TO ENSURE THE QUALITY OF EDUCATION AT THE UNIVERSITY

During the digitalization of education, traditional tools for managing and organizing the educational process no longer meet the educational needs of different categories of participants – students, teachers, administration, etc., so the quality of information and educational environment of the university acquires special importance (Buinytska, 2021), which will ensure transparency and openness of the organization of the educational process, management, research, internationalization, etc. and will allow participants to access it from anywhere and at a convenient time. One of the components of such an informational and educational environment is the e-portfolio system, which

is used to analyze various aspects of teachers' activities: scientific, international, teaching activities and professional development. Therefore, to ensure monitoring of the level of teacher competence, transparency and openness of data, the issue of implementing open systems for research analysis is relevant for the university, which will have a positive impact on the presentation of professional results of university teachers in ranking.

An analysis of the official websites of leading Ukrainian and international universities on the format of presenting the results of research activities of university teachers in open access showed the lack of implemented tools to ensure transparency, openness of key indicators of research activities of teachers.

The National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" has implemented the "Information System Intellect" (Intellect, 2023), which is designed to present the results of the university scientists. The system contains personal pages of scientific and pedagogical, research staff of the university, graduate students, which contains a list of their scientific publications, results of research and development work, reports at scientific conferences, seminars, including international, identifiers of scientometric databases – Scopus Author ID, ORCID, Google Scholar.

At the Taras Shevchenko National University of Kyiv are formed rating tables of publication activity of employees within the university and rating of publication activity of structural subdivisions. Summary ranking tables within the general reports on scientific work in the form of files are published on the official website of the University (Research department of KNU, 2023). The calculation of the rating takes into account the number of monographs, textbooks, scientific articles, citations and the number of articles indexed by the scientometric database Scopus.

At the National Pedagogical Dragomanov University has been introduced a rating system for evaluating the activities of research and teaching staff, but access to it is limited (Rating system of NPDU, 2022).

Lviv Polytechnic National University has introduced an e-portfolio of teachers based on wiki technologies (LPNU, 2023). In addition to personal information, pages of teacher's present areas of study, research interests, a list of selected publications, but there are no links to open access publications and researcher profiles and citation rates in scientometric databases.

The personal pages of teachers of Kryvyi Rih State Pedagogical University contain basic personal information – position, degree, academic title, research interests, etc., as well as links to the teacher's

profile in scientometric databases, published scientific papers in the Institutional Repository. The university also formed and published in the form of a file a rating of scientific activities of departments on the main indicators of scientific activity – the number of articles in databases Scopus, Web of Science, Index Copernicus, articles in professional journals, published monographs, defended dissertations, etc (KRSPU, 2023).

The website of the National Aviation University publishes ratings of teachers on the indicators of scientometric databases Scopus, Web of Science, Google Scholar, Russian Science Citation Index (Scientific library of NAU, 2023). The ranking is based on the value of the h-index, as well as the number of publications and citations in the relevant databases. Data for the ranking are obtained from personal pages of teachers, which contain links to the profile of the scientist in scientometric databases with citation rates – number of publications, number of citations, h-index, direction of scientific interests, English transcription of the scientist's name, links to published papers in scientific journals, conference proceedings, publications placed in the institutional repository, etc.

On the official websites of leading foreign universities, employees' pages are published in the form of an e-portfolio with basic contact information and performance indicators. No open ranking rating systems were identified during the study. For example, on the websites of Harvard University, Stanford University, University of Washington, Massachusetts Institute of Technology, published pages of employees contain mostly general contact information, information about education, work experience, research interests, awards, list of selected publications and more (Harvard, 2023; Stanford, 2023; Washington, 2023; MIT, 2022).

The study (Spivakovsky et al., 2019) highlights the experience of designing an information system for the analysis of research activities of university teachers, which is tested on the basis of Kherson State University and Kherson State Maritime Academy. The system implements tools for building ratings of teachers on the main indicators of scientific citation in databases Scopus, Web of Science, Google Scholar, Semantic Scholar, Tutor Network. Ratings are built in terms of structural units, departments, scientific journals on the maximum value of quoting profiles of employees in the unit (Rating of KSU departments, 2023). Data for the ranking are obtained from personal pages of employees, which presents the main citation indicators in scientometric databases – researcher identifiers, citation indicators (number of documents, citations, h-index), list of indexed publications, list of co-authors. The system allows to an-

alyze the publishing activity of university scientists in terms of years in a visualized form, to determine the priority areas of research, to build a network of co-authors.

Borys Grinchenko Kyiv University has implemented an “E-portfolio” system, which reflects a holistic picture of the teacher’s activities with certain quantitative and qualitative indicators. The system allows not only to create an e-portfolio of the teacher, but also to form rating tables of indicators of evaluation of the main activities of each teacher and structural units (Morze and Buinytska, 2017). Borys Grinchenko Kyiv University has implemented Corporate Standards for Teachers, in particular the Corporate Standard of Research Activity and the Corporate Standard for Digital Competence of Teachers, which take into account and correlate indicators of teachers’ research results and corresponding indicators of digital competence levels of teachers. One of the indicators of compliance of the teacher’s research activities with the requirements of the Corporate Standard of Research Activity of Borys Grinchenko Kyiv University (Corporate Standard of Research Activity, 2018) is the indicator of scientific recognition, which is determined by the values of citation indices in Scopus, Web of Science, Google Scholar databases. The key to the optimal presentation of the teacher’s research activities in scientometric databases is a sufficient level of digital competence of the scientist (Bykov et al., 2021), which is the ability to effectively use open digital systems in their own research, create, update, supplement articles profiles of scientists in scientometric databases, disseminate research results in scientific web communities and social networks (Corporate Standard of Digital Competence, 2021).

Analysis of official university websites shows that modern universities use a variety of technologies to present the results of research activities of teachers, including Wiki-technologies, published pages on official websites, developed information systems. The main technologies used in the construction of ratings of research activities of teachers are the publication of rating tables in the form of files, the introduction of information systems with tools for rating. The introduction of information systems has a number of advantages, such as rapid data updates, the formation of a single database of employees, automation of ranking, reviewing the details of the indicators, the ability to generate reports, present information in a convenient visualized form.

Analysis of the experience in developing rating systems for evaluating the research activities of teachers determines the most common quantitative indicators of evaluation of research activities: publica-

tions included in influential scientometric databases, including Scopus and Web of Science; values of citation indices in scientometric databases – Scopus, Web of Science, Google Scholar, etc. (Morze and Buinytska, 2017).

4 TOOLS FOR DETERMINING THE PUBLICATION ACTIVITY OF TEACHERS

The main indicators of assessing the publishing activity of teachers are the number and quality of published scientific works, namely the number of individual and collective monographs, articles in publications included in scientometric databases Scopus and Web of Science, articles in publications included in other scientometric databases, articles in professional scientific publications included in the approved list of the Ministry of Education and Science of Ukraine, citation indices in scientometric databases, the number of published publications on the results of scientific conferences and seminars, including international, etc.

The most common tools for assessing the publishing activity of teachers are the determination of citation indices in scientometric databases. Scopus and Web of Science databases allow scientometric analysis of a scientist’s productivity by analyzing the dynamics of the number of publications in influential international journals, the impact and demand for scientific publications, analyzing the dynamics of bibliographic references and citation indices by year (Smirnova, 2020).

Scopus and Web of Science have powerful analytical tools SciVal and InCites, respectively. The tools allow for a comprehensive analysis of the effectiveness of research on a wide range of indicators: impact, productivity, collaboration, open access, influence of journals, etc. in a visual rendered form; identify promising areas of research, expand the range of scientific collaboration and cooperation.

An alternative to commercial systems is the free Google Scholar system, which indexes full-text scientific publications from many disciplines in various databases. The main advantage of Google Scholar is its freeness and the fact that its index is not limited to a list of journals, unlike commercial scientometric databases like Scopus, Web of Science, but more broadly covers the web space, it indexes publications on electronic journals, repositories, electronic conferences, personal blogs of scientists, etc. For efficient indexing, web resources should be based on platforms

with special meta tags (EPrints, DSpace, Open Conference System) (Luparenko, 2020), from which the Google Scholar system receives basic meta data of the publication or publication files designed according to certain formatting requirements of document – design of titles, personal data of the authors, the main content of the article, the list of sources used, etc. (Bykov and Spirin, 2016). The Google Scholar system allows a researcher to create a personal profile and add system-indexed publications to it. The Google Scholar profile has a toolkit for analyzing citation statistics by year, tracking total citations, h-index and i10 index, which are calculated on the basis of the total number of publications and the number of citations by individual indicators for the entire period of scientific work and for the last 5 years in digital form and in the form of a comparative histogram (Smirnova, 2020).

On the basis of scientometric indicators of teachers in scientometric databases the profile of the university is formed, which reflects the main direction of scientific research and the productivity of the research component of the university in general. Figures 1-3 presents the profiles of Borys Grinchenko Kyiv University in open scientific systems and databases: Scopus (figure 1), Open Ukrainian Citation Index (figure 2), Google Scholar (figure 3).

The analysis of indicators confirms that a set of indicators of important scientometric databases should be used for a full comprehensive assessment of the effectiveness of research in various areas.

5 RESEARCH RESULTS

5.1 Model of Rating System of Evaluation of Teachers' Research Activity

In building the model of the rating system for evaluating the research activities of the teacher used indicators of key scientometric databases that demonstrate the effectiveness of research activities of the teacher – Scopus, Web of Science and Google Scholar, quantitative indicators of evaluation and analysis using bibliographic citations. At the same time, it is important for university professors to adhere to the Corporate Standards of Scientific Activity and the Corporate Standard of Digital Competence approved by Grinchenko University, as the level of scientific and digital competence directly affects the quality of research and therefore the university's international and domestic rankings.

The following principles were guided in develop-

ing the methodology of the rating system for evaluating research activities of teachers: objectivity, measurability and transparency, so the indicators of citations of scientific publications in open profiles of teachers in Scopus, Web of Science and Google Scholar were chosen as indicators of research performance of teachers easy to get and check – number of bibliographic references, h-index and i10-index.

The main functions to be performed by the rating system of analysis of the research component of the university teachers are presented in table 2.

The implementation of certain functions is possible in the presence of such structural components of the rating system for evaluating research activities as the organizational component, the component of obtaining personal data of teachers, technological component and performance component.

The organizational component provides for the delimitation of access rights to the rating system – administrator, teacher, guest. Administrator rights include starting the formation of the rating, marking incorrectly filled profiles, exporting reports. Rating is available only for viewing and analysis for teachers and unauthorized users.

Component of obtaining personal data of teachers. A personal page in the “E-portfolio” system is automatically generated for each lecturer of the Borys Grinchenko Kyiv University. On the personal page of the e-portfolio the teacher can independently establish the affiliation to the structural unit, department, indicate the degree, academic title, links to the profile of the scientist in Scopus, Web of Science, Google Scholar and ORCID, as well as other personal data and links to pages in social networks Facebook, LinkedIn and on the Wiki-portal of the university. Data from the profile of the e-portfolio of the teacher on the affiliation to the structural unit, department and indicators of scientific citation in Scopus, Web of Science and Google Scholar are obtained during the formation of the rating.

The technological component provides scientometric indicators from Scopus databases, Web of Science, Google Scholar system and personal data of teachers. The structural model of the technological component of the model of the rating system of analysis of research activities of teachers is presented in figure 4. The E-portfolio system of Borys Grinchenko Kyiv University automatically synchronizes the values of bibliographic references, h-index and i10-index for the last 5 years from the bibliographic profile of a scientist in the Google Scholar system, a link to which the teacher can add to his portfolio.

In addition, the “E-portfolio” system automatically synchronizes scientometric indicators from the

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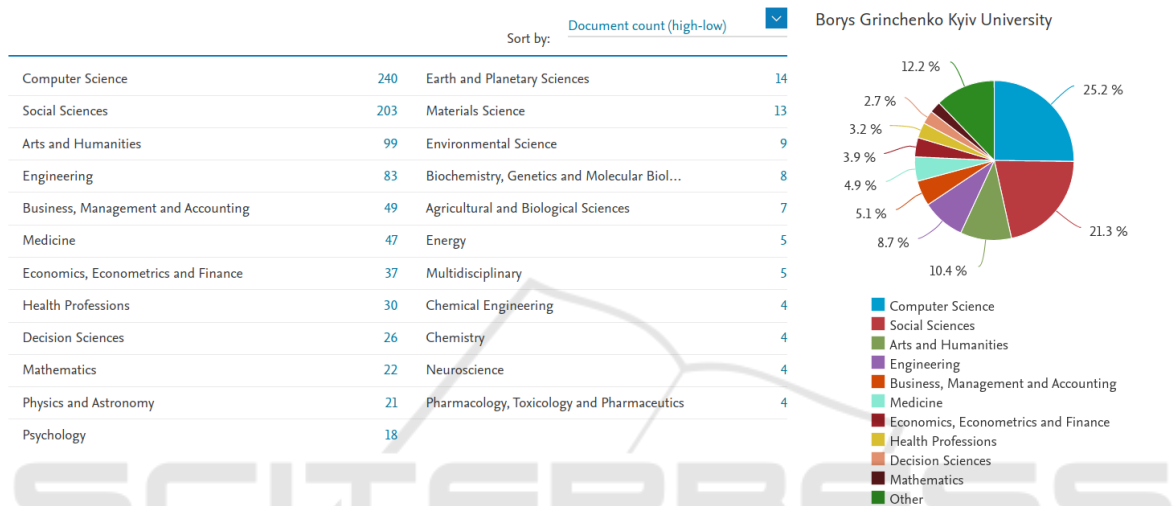


Figure 1: Profile of Borys Grinchenko Kyiv University in the Scopus scientometric database.



Figure 2: Profile of Borys Grinchenko Kyiv University in the Open Ukrainian Citation Index database.

teacher’s profile in Scopus and Web of Science using API-interfaces. The main scientometric indicators are automatically synchronized to the teacher’s e-portfolio page – the number of publications indexed by scientometric databases under the university affiliation, the number of citations and the h-index. Data are obtained from the Scopus Author Identifier and the Web of Science ResearcherID, which the teacher

can add to their own e-portfolio profile. The profile values of scientometric indicators from Scopus, Web of Science and Google Scholar databases are obtained during the formation of the “Transparency Rating”, which is one of the results of the designed model and allows to assess the scientific achievements of a particular teacher and the university in general.

To reflect the importance of the teacher’s research

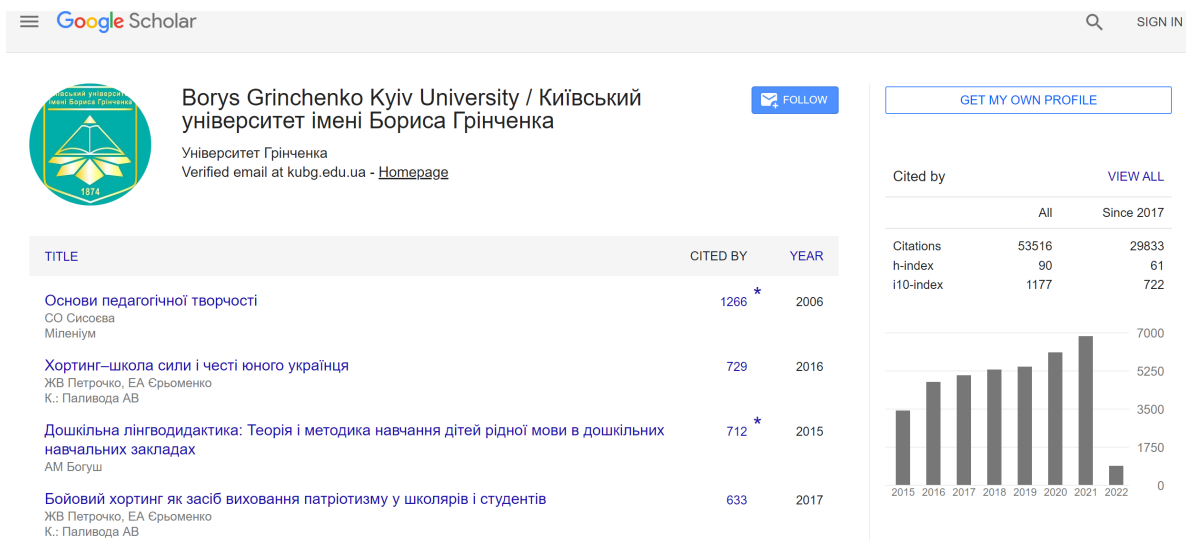


Figure 3: Profile of Borys Grinchenko Kyiv University in the Google Scholar database.

Table 2: Functions of the rating system of analysis of the research component of the university teachers’ activity.

Function	Description
Informational	Formation of a single information base of research performance indicators of university teachers for quality assessment
Visualization	Presentation of information in a visualized form to improve perception, reporting
Motivational	Creating an atmosphere of healthy competition, activating the scientific potential of the university
Competence	Encouraging teachers to create, update information in their own profiles in scientometric databases
Analytical	Analysis of the current state of the research component of the activities of departments, chairs and the university in general, identification of factors influencing the effectiveness of research activities of teachers, identification and analysis of relationships
Prognostic	Forecasting of perspective trajectories of university development, development of system measures for increase of indicators of efficiency of research activity of university teachers
Management	Information basis for making management decisions

activity in a certain scientific field, it is planned to expand the technological component of the rating with a new indicator of the Web of Science system – Author Impact Beamplots. The indicator is a normalized indicator of a scientist’s citation, reflects the effectiveness of citing the publication and allows to provide a qualitative assessment of the effectiveness of research activities.

Effective component – on the basis of collected data on the affiliation and scientometric indicators of teachers are formed ranking tables of research performance at the university in general and in terms of departments and chairs, based on which the ability to export reports.

Structurally functional model of the rating system for the analysis of research activities of teachers is described in detail in the study (Morze et al., 2022b) and has the following view (figure 5).

5.2 Transparency Rating Methodology and Design

Taking into account the model of the rating system for the analysis of research activities of teachers, a transparency rating has been designed, the indicators of which are system performance indicators.

The rating system model was implemented as a web-based client-server architecture. The PHP programming language was used in the development of the server software. The web interface is implemented using HTML, CSS and JavaScript.

As a result of experimental implementation, a Google Scholar citation rating was developed, which ranks teachers according to their indicators of publishing activity (figure 6).

All teachers of the Borys Grinchenko Kyiv Uni-

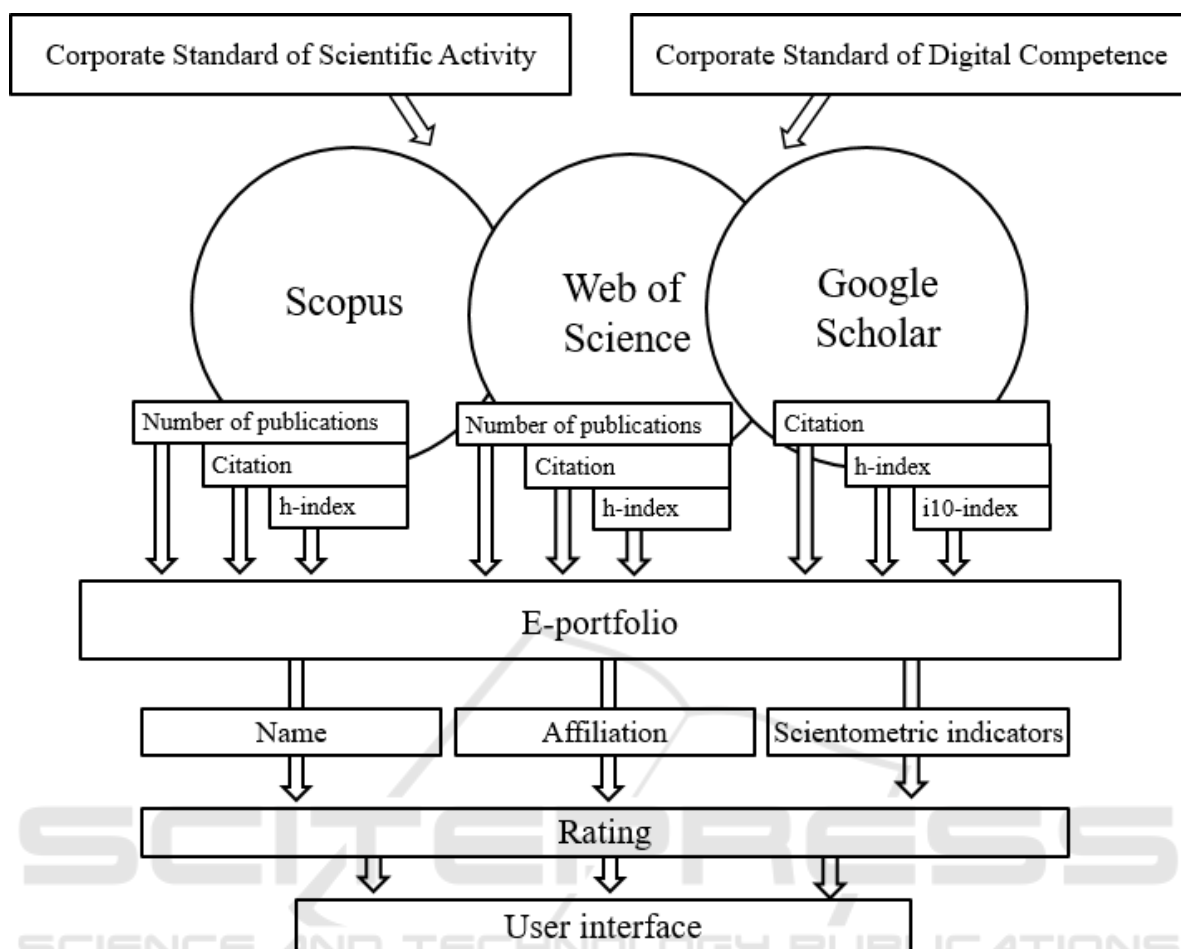


Figure 4: Technological component of the model of the rating system for evaluating the research activities of teachers.

versity take part in the “Transparency Rating of Structural Units”. In the ranking, the list of teachers is ranked in descending order of the value of the total number of bibliographic references according to the Google Scholar system. The detailed table of research indicators contains the values of the total number of bibliographic references, h-index, i10-index and links to the teacher’s profile in Google Scholar. Also, the page of the rating of teachers reflects the dynamics of citation indicators compared to the previous issue of the rating, which allows teachers to monitor and analyze the effectiveness of their own research activities.

The increase in the total number of citations of both the h-index and the i10-index in the teacher’s profile may be due to the indexing by Google Scholar of new publications by other authors that contain direct citations of articles of the teacher; supplementing Google Scholar’s teacher profile with previously unstated publications that are already cited in research by other Google Scholar-indexed researchers. On the other hand, a decrease in citation rates may be due to

a change in the five-year citation period. When the five-year citation period changes, the publication may no longer be included in the calculation, which negatively affects the total number of citations and the value of the indexes. Another possible reason may be the disappearance from the Google Scholar index or open access to a publication that contains a citation of the relevant article by the teacher.

Creating a database of scientific profiles of teachers in Google Scholar allowed to implement the designation of incorrectly configured profiles in one place.

In addition, the presence of this database of scientific profiles of teachers ensured the implementation of the formation of scientific profiles of structural units with the definition of citations per teacher of the unit (figure 7).

To design the rating of structural units and departments, the average citation rate per 1 teacher was determined as the ratio of the sum of the total number of citations to the number of full-time employees of the structural unit. This approach reflects the con-

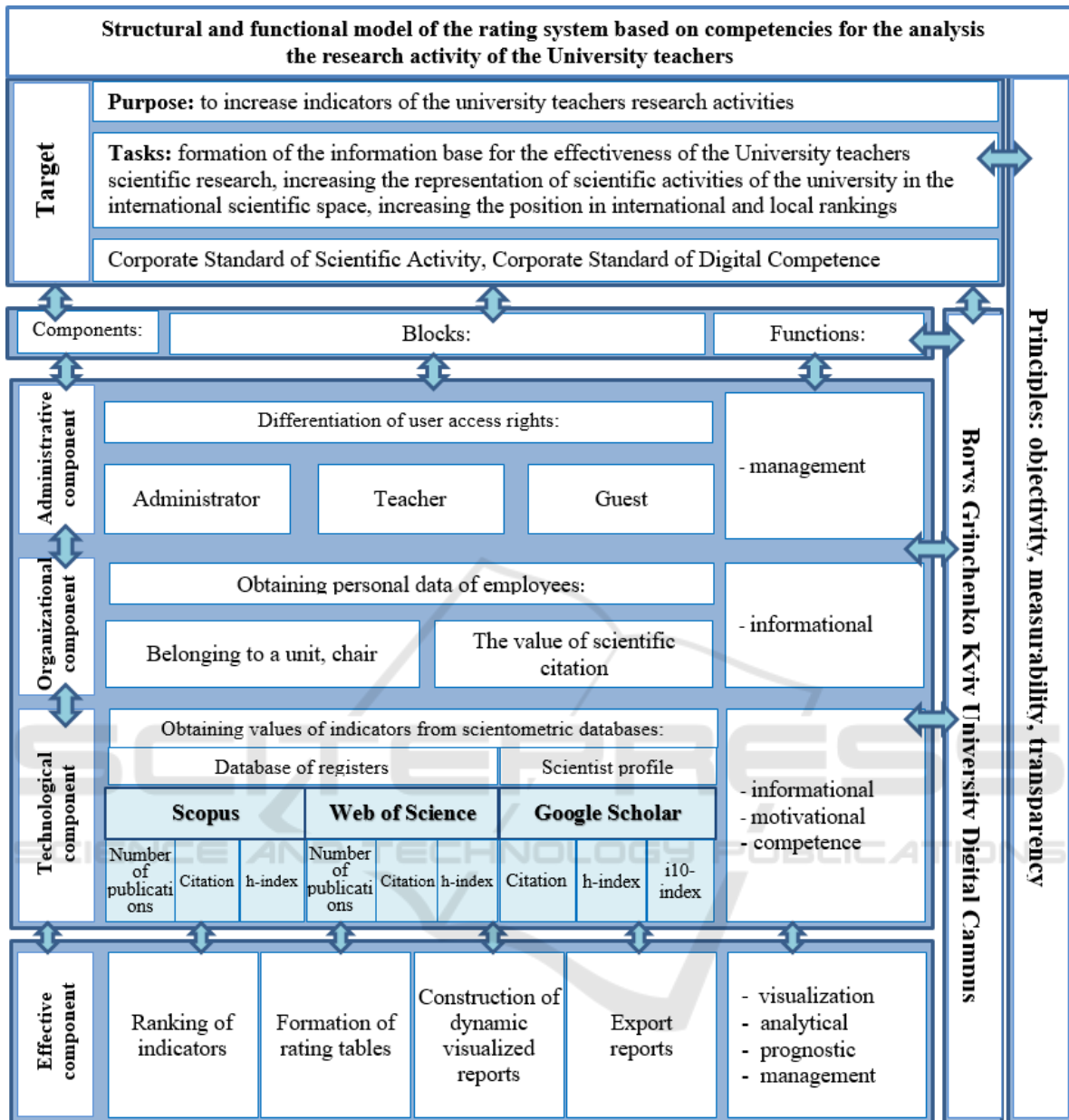


Figure 5: Structurally functional model of the rating system for the analysis of research activities of teachers (Morze et al., 2022b).

tribution of each individual teacher in the scientific achievement of the structural unit and the effectiveness of the research team in general. In the case of the same values, the units in the “Transparency Rating” are ranked by the total number of citations, which is defined as the sum of the number of citations according to Google Scholar for a five-year period of all staff members of the structural unit.

The ranking of structural units and chairs in the “Transparency Rating” is carried out in descending order of the average citation rate per 1 teacher. In

the case of the same average citation rates, the structural units are ranked in descending order of the total number of citations of teacher profiles. The choice of the Google Scholar system is due to the fact that, unlike the scientometric databases Scopus and Web of Science, it has a wider coverage and includes publications from these databases and has a high level of correlation in citation values with Scopus, Web of Science, which is confirmed by the results research (Martín-Martín et al., 2018a,b) and provides a greater presence of teachers in the ranking.

№	Name	Structural Unit	Department / Research Laboratory	Number of citations	Dynamics of the number of citations	h-index	Dynamics of the h-index	i10-index	Dynamics of the i10-index	Google Scholar
1	Morze Natalia Viktorivna	FITM	Department of Computer Science and Mathematics	2714	+465	23	↗ 2	84	↗ 21	Google Scholar
2	Petrochko Zhanna Vasylivna	IHS	Department of Social Pedagogy and Social Work	1908	+932	12	↗ 1	14	↗ 3	Google Scholar
3	Kraus Natalia Nikolaevna	FITM	Department of Finance and Economics	1500	+638	19	↗ 6	48	↗ 25	Google Scholar
4	Styshov Alexander Anatolyevich	IP	Department of Ukrainian Language	974	+974	10	↗ 10	10	↗ 10	Google Scholar
5	Oleksyuk Olga Mykolayivna	IA	Department of Musicology and Music Education	923	+152	10		10		Google Scholar
6	Videiko Mykhailo Yuriiovych	FHP	Archeology Research Laboratory	917	-105	16	↘ -1	28	↘ -3	Google Scholar
7	Ilyich Lyudmila Mykolayivna	FITM	Department of Management	819	+129	10		12	↗ 2	Google Scholar
8	Kraus Kateryna Mykolayivna	FITM	Department of Management	787	+349	14	↗ 4	22	↗ 11	Google Scholar
9	Lytvyn Oksana Stepanivna	FITM	Department of Computer Science and Mathematics	777	+88	15	↗ 1	27	↗ 4	Google Scholar
10	Lysenko Olena Mykolayivna	FHPES	Department of Physical Rehabilitation and Biokinesiology	707	+112	13	↗ 1	22	↗ 7	Google Scholar

Figure 6: Ranking of teachers by citation indicators in Google Scholar.

№	Unit	Average citation rate per 1 teacher	Dynamics of average citation rate per 1 teacher	Total number of citations	Dynamics of the total number of citations
1	Faculty of Information Technology and Management	181.1	+43.89	10866	+2908
2	Institute of Human Sciences	133.14	+56.86	6657	+2309
3	Faculty of History and Philosophy	83.2	-0.12	3827	-89
4	Pedagogical Institute	80.43	+18.19	4906	+985

Figure 7: Transparency Rating of Structural Units according to citations in Google Scholar.

To analyze the effectiveness of research activities of the unit on the page of the rating of units and chairs realized the dynamics of citation rates per 1 teacher and the total number of citations compared to the previous issue of the rating. Increasing the value of citations per 1 teacher in the rating of the chair or department can occur both by increasing the number of citations of teachers and by increasing the proportion of highly cited employees in the structural unit.

Visibility and transparency indicators of the university are influenced not only by the activities of teachers, but also by chairs in general, including the dissemination of information on social networks about the main activities, announcements of scientific events, videos, research results and more.

Monitoring of key indicators of research activities of structural subdivisions of the Borys Grinchenko Kyiv University is carried out monthly due to the developed internal rating of structural units, the methodology of which is based on the indicators of the international Webometrics rating. Analyzing the internal rating for research activities, attention is paid to the Quality indicator, namely, the rate of uploading scientific papers to the Institutional Repository, citation

rates according to Google Scholar (figure 8).

To monitor the representation of chairs in the Internet space at the Borys Grinchenko Kyiv University, the frequency of updating the official pages of departments in social networks and Google Scholar is periodically analyzed, the results of which are reflected in a specially developed information resource (figure 9). The resource contains a database of official pages of the chairs on social networks Facebook, YouTube and profiles in the Google Scholar system, for which the period of the last update of the profile is marked with special marks, such as week, month, three months, etc.

Periodic monitoring of the period of updating the pages of chairs on the Internet is a motivating factor for updating, filling pages on social networks, disseminating information about current research activities, research results, updating profiles of chairs in Google Scholar, thus increasing visibility, openness and dissemination information about the scientific activity of the departments and the university in general.

To further analyze the ranking positions and indicators of research activities of teachers, build visualized reports on the effectiveness of research activities,

Place in the general rating of subdivisions	Subdivision	Webpage of Subdivision	Visibility (55%)					Quality (25%)				Transparency (20%)				Total rating			
			Link source domains, 10%	External backlinks, 30%	Facebook, 5%	Visits for the last month, 10%	Visibility rating	Place in Visibility rating	Index of publishing activity, 15%	Institutional repository, 10%	Quality rating	Place in Quality rating	h-index (Google Scholar), 7%	Bibliographic references, 10%	i10-index, 3%		Transparency rating	Place in the Transparency Dynamics of the general rating for a month	
1	Institute of Human Sciences	il.kubg.edu.ua	1	1	34	5 420	5,65	4	0,67	34	5,47	1	30	88	100	3,29	3	1,4	14,4
2	Faculty of Information Technology and Management	fitu.kubg.edu.ua	1	1	3	4 225	4,61	7	0,61	33	5,11	2	28	97	150	3,64	2	-0,2	13,3
3	Pedagogical Institute	pi.kubg.edu.ua	1	1	35	6 519	5,82	3	0,36	21	3,08	3	28	112	121	3,82	1	1,1	12,7
4	Institute of Philology	if.kubg.edu.ua	1	1	10	11 586	5,62	5	0,21	35	3,06	4	22	44	86	2,04	4	-0,2	10,7
5	Institute of Journalism	ij.kubg.edu.ua	1	2	6	8 290	8,09	1	0,11	6	0,93	9	15	13	24	0,88	8	1,0	9,9
6	Institute of Arts	im.kubg.edu.ua	1	1	9	3 285	4,59	6	0,27	25	2,83	5	16	18	37	1,08	7	5,0	8,5
7	Faculty of Health, Physical Education and Sports	fzfv.kubg.edu.ua	1	1	6	2 255	4,37	10	0,14	6	1,07	8	18	48	42	1,79	5	-0,8	7,2
8	Vocational College "Universum"	uk.kubg.edu.ua	1	1	19	14 492	6,26	2	0,02	2	0,22	11	11	11	14	0,66	10	-1,7	7,1
9	Institute of In-Service Training	ippo.kubg.edu.ua	1	0	30	21 080	4,40	9	0,15	8	1,25	7	14	12	21	0,81	9	-0,8	6,5
10	Faculty of Law and International Relations	fpmv.kubg.edu.ua	1	1	3	4 013	4,49	8	0,07	3	0,53	10	7	2	5	0,30	11	-3,6	5,3
11	Faculty of History and Philosophy	iff.kubg.edu.ua	1	0	0	2 381	1,19	11	0,19	8	1,44	6	20	34	64	1,67	6	-1,3	4,3

Figure 8: Internal rating of structural subdivisions of Borys Grinchenko Kyiv University.

Representation of the departments of Grinchenko University in the Internet space

Symbols of the period of the last update of the official page of the department on Facebook and YouTube:

- during the week
- within a month
- 1-3 months
- 3-6 months
- 6-12 months
- over a year
- no records

Published data as of the beginning of 2022.

#	Unit	Chair	Facebook	YouTube	Google Scholar	Number of publications GS (21/22)
1	Institute of Journalism	Department of Journalism and New Media	Facebook	YouTube	Google Scholar	14
2	Institute of Journalism	Department of Advertising and Public Relations	Facebook	YouTube	Google Scholar	9
3	Institute of Journalism	Department of Publishing	Facebook	YouTube	Google Scholar	6

Figure 9: Representation of University Chairs in the Internet space.

it is planned to implement 2 stages of research – expanding the “Transparency Rating” for other indicators presented in the model – the number of publications in databases Scopus and Web of Science with university affiliation, establishing relationships to increase the publishing activity of teachers.

5.3 Influence of Rating Indicators on the Improvement of Research Activities at the University

The research took place in several stages: preparatory, design, experimental (implementation).

At the preparatory level the theoretical bases of rating estimation of research activity of research and pedagogical workers were investigated. At the design stage, a structural-functional model of the rating system for evaluating teachers’ research activities was designed, a “Google Scholar Citation Transparency Rating of Structural Units” was developed, and an experimental rating was built. For two months, the administration and faculty of the university had the opportunity to review and analyze the data of the experimental rating, after which the first issue of the rating was built in June 2021. The second issue of the rating was built in January 2022.

The analysis of the experimental, first issue and second issues of the rating, built with an interval of 2 and 6 months, respectively, confirmed the positive dynamics of research performance (figure 10).

There is an increase in the total number of citations and the value of citations per 1 research and teaching staff for all units. The largest increase in citations is the Institute of Philology, which increased the total number of citations by 2648 (+117%) and citations per teacher increased by 15,01 (+109%) and the Institute of Human, whose total citations increased by 2948 (+79%) and citations per 1 teacher increased by 69,19 (+108%), which indicates the active work of teachers in these departments to update and supplement their research profiles in the Google Scholar system.

A negative factor in evaluating the results of research of university teachers is the possible cases

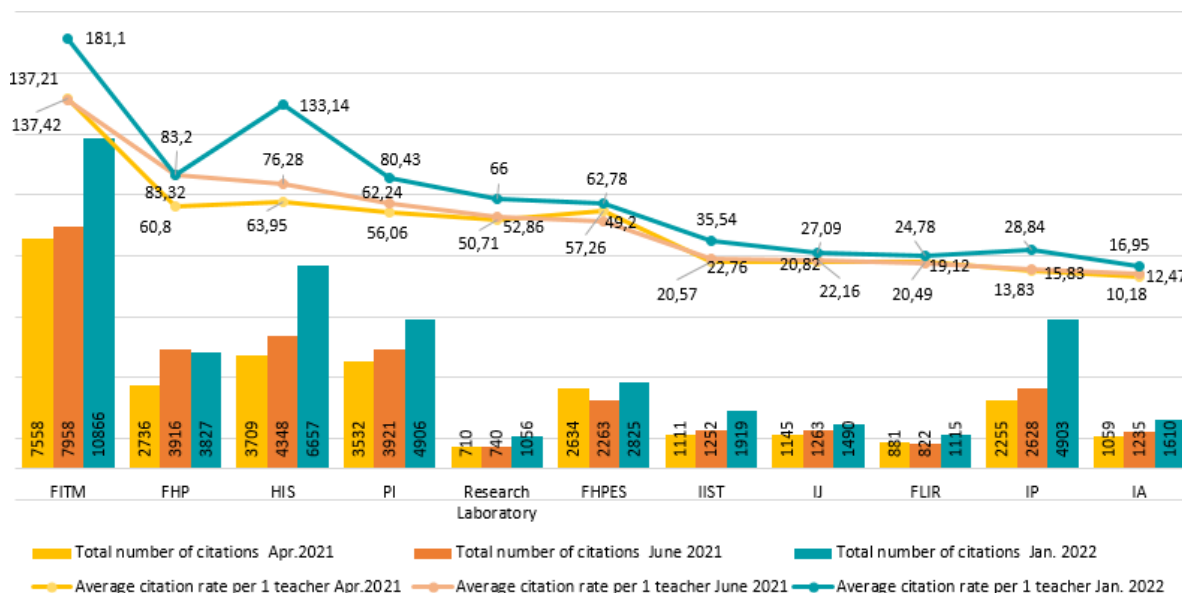


Figure 10: Diagram of citations of the experimental, first issue and second issues of the rating.

of intentional influence on citation rates to increase them, in particular by violating the principles of academic integrity, increasing the percentage of self-citation, etc. (Recommendations NAQA, 2022). In order to reduce the possibility of intentional influence on increasing citation rates, the rating system uses a set of indicators of various scientometric databases, including important international databases Scopus and Web of Science, which make high demands on the quality of scientific publications in the included publications, which reflects the quality and demand for research results on the accumulation of the number and volume of publications and citations.

Having a system and rating is an incentive for teachers to update their e-portfolio profiles, create profiles in scientometric databases, in the absence, update information in profiles, including Google Scholar, supplement indexed publications, disseminate research results, discuss them in the international networked scientific community, thus developing skills in the use of digital technologies in the organization of research and dissemination of research results.

The active work of university teachers on updating their own profiles in the Google Scholar system and the positive impact of the rating system of analysis of research activities of university teachers on visibility, transparency is also confirmed by the dynamics of Grinchenko University in the international ranking “Transparent Ranking: Top Universities by Google Scholar Citations” during 2020-2022 years. The rating methodology is based on the importance of

citing profiles of university employees in the Google Scholar system.

Analyzing the indicators of the university in the ranking of 2022, we note that the value of the total number of citations of employee profiles in the Google Scholar system increased by 10921, which is almost 4 times more than the increase in citations from the previous year (+2735). However, the overall position of the university in the ranking of Ukrainian universities decreased by 4 positions, as other universities are also actively working to increase the openness and transparency of research results (figure 11).

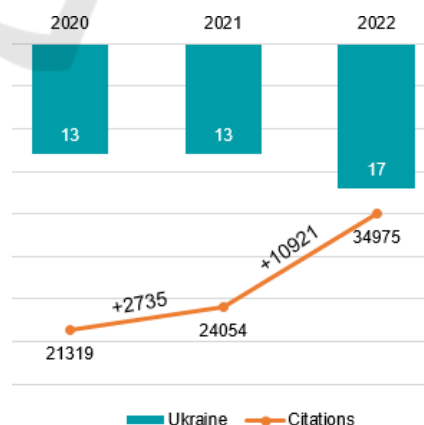


Figure 11: Dynamics of university indicators in the rating “Transparent Ranking: Top Universities by Google Scholar Citations” for the period 2020 – 2022.

According to the results of the study, it was determined that the optimal presentation of the results

of research activities of teachers in the ranking contributes to (Smirnova, 2021):

- implementation of measures to ensure open access, transparency, openness of research results;
- use of open journal systems when publishing research results (Open Journal Systems, Open Conference System, DPubS, OpenACS, etc.) (Luparenko, 2020);
- giving preference to publications that give articles a unique DOI that simplifies publication identification and provides a permanent link to the publication, regardless of the change in the publication's web address;
- use of the international identifier of the ORCID scientist to correctly determine the affiliation of the article to the author's profile. ORCID International Scientist Identifier is designed to unambiguously identify the author of an article, which is especially relevant in the case of different spellings of the name of the scientist, scientists with the same names and surnames, etc.;
- placement of publications in open institutional repositories, electronic libraries to increase the visibility of scientific achievements in the network;
- systematic updating of scientist profiles in scientometric databases to increase visibility and update citation indexes such as Google Scholar, ResearchGate, Mendeley, etc.;
- placement of researcher IDs and profile links in scientometric and bibliometric databases on the e-portfolio page (Scopus Author ID, Researcher ID, Google Scholar, ResearchGate, etc.);
- implementation of measures to disseminate research results to increase visibility and presence in the international scientific community.

Currently, work is underway to refine and expand the rating on other indicators Scopus, Web of Science, presented in the model to obtain a full-fledged rating system; systems of analytics and statistics with the formation of dynamic visualization of the effectiveness of the scientific potential of the university.

6 CONCLUSIONS

One of the tools for measuring the competitiveness of universities is participation in international and domestic educational rankings. Full and objective assessment in the most authoritative international and Ukrainian rankings is provided by a set of indicators

covering various areas of university activities, including research. To monitor the university's indicators in the rankings, it is important to implement internal university rankings, the methodologies of which are based on key performance indicators that are taken into account in international and Ukrainian educational rankings. One of the key indicators of educational ratings are indicators of research activities of university teachers, so for the implementation of systematic monitoring of openness, transparency of the effectiveness of research activities of teachers is an effective tool to develop and implement a rating system for research analysis. Ensuring transparent evaluation of teachers' professional activities, increasing openness, transparency of university activities, open access to results, professional and scientific achievements of teachers are fundamental components of the internal quality assurance system of education. Also, the placement of open identifiers of scientists in scientometric databases, research results, contact data of the scientist promotes the dissemination of knowledge in the scientific information space and allows to expand the possibilities of scientific cooperation.

The rating system for research analysis is based on the indicators of the three most important scientometric databases – Scopus, Web of Science, Google Scholar and provides the main functions – informational, visualization, motivational, competence, analytical, prognostic and management. The rating system is implemented as a web-oriented client-server architecture. One of the components implemented in the system at the 1st stage of the study is the “Google Scholar Transparent Rating”. Based on the results of the research were developed recommendations for improving the quality of teachers' research activities. The formation of the rating confirmed the importance of designing a system of research analysis that improves the quality of research, dissemination of research results in the international educational space, analysis of teachers' own development, monitoring the scientific growth of university faculty and obtaining visualized analytics in real time. Prospects for further research are seen in supplementing the ranking with other indicators of research, implementing real-time rating system updates, integration of modern business intelligence systems to build visualized statistics to analyze the effectiveness of the research component of the university.

Systematic implementation of measures to ensure open access to own research results, increase visibility, transparency and dissemination of research results on the Internet contributes to the optimal representation of the scientist in the rating of the research component of professional activities of university teach-

ers, improving professional competence of teachers and positively influences on the indicators of the quality of research work of higher education institutions in domestic and international rankings.

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