

UDC 378

DOI: 10.52534/msu-pp1.2024.116

Mykola Matkivskyi*

PhD in Technical Sciences, Associate Professor
Vasyl Stefanyk Precarpathian National University
76018, 57 Shevchenko Str., Ivano-Frankivsk, Ukraine
<https://orcid.org/0000-0001-5039-0260>

Tetiana Taras

PhD in Chemical Sciences, Associate Professor
Vasyl Stefanyk Precarpathian National University
76018, 57 Shevchenko Str., Ivano-Frankivsk, Ukraine
<https://orcid.org/0000-0002-5801-1285>

Methods and technologies for evaluating the quality of higher education in the context of international standards: A comparison of the Ukrainian and Polish experience of creating ratings

Article's History:

Received: 03.11.2023

Revised: 05.03.2024

Accepted: 27.03.2024

Suggested Citation:

Matkivskyi, M., & Taras, T. (2024). Methods and technologies for evaluating the quality of higher education in the context of international standards: A comparison of the Ukrainian and Polish experience of creating ratings. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 10(1), 116-127. doi: 10.52534/msu-pp1.2024.116.

Abstract. The need to study the methods and technologies used to assess the level of educational services is primarily due to constant transformations in educational processes, improvement of the system of criteria used to rank higher education institutions. The purpose of this study was to analyse the tools used to assess the performance of higher education institutions in the context of international standardization of educational processes. The main methods used in the study were statistical analysis, comparative and contrastive and analytical and synthetic methods. The comparative and contrastive analysis revealed that research activities were among the main indicators that influenced the creation of the rankings: Times Higher Education University Impact Rankings (60%), TOP-200 Ukraine (42%), Perspektywy (42%), and prestige and reputation: QS World University Rankings (40%), Times Higher Education University Impact Rankings (30%), TOP-200 Ukraine (12%). The methods used to create the rankings included statistical, pedagogical analysis, analytical and synthetic methods, and surveys. To create the Ukrainian ranking, 6 international (Webometrics, Scopus, Times Higher Education World University Rankings, Times Higher Education University Impact Rankings, UniRank, QS World University Rankings) and 4 national (participation in research project competitions, number of patents received, awards for young scientists, the ratio between the number of applications and the competition score) indicators were used. The Polish ranking was based on 29 indicators divided into groups: prestige, scientific effectiveness, scientific strength, scientific and educational potential, internationalization, graduates on the labour market, innovation, study conditions, and economic cooperation. In Poland, there was a balance between international and national criteria, while in Ukraine, about 70% of international criteria and 30% of national criteria were used. This work can be used in the future to improve national and international systems for assessing the quality of higher education, and to develop a unified mechanism for creating ratings

*Corresponding author

Keywords: prestige; weighting; scientific activity; national experience



INTRODUCTION

The study of methods for assessing the quality of educational services in terms of international standards is necessary, given the constant changes taking place in educational processes and the transformation of approaches to mechanisms for assessing the quality of higher education, in particular, through its internationalization. Since there is still no clear tool for creating international and national rankings, it is important to study different technologies and identify key indicators that affect the ranking of higher education institutions in ascending order.

A comparative analysis of the main criteria for creating a ranking of higher education institutions, including international and national ones, allows for determining which indicators of education quality are prioritized according to international standards and which are underestimated. In particular, the correlation between such parameters as prestige and reputation, quantitative and educational indicators, research activities, student employment, international prospects, financial indicators, and technical capabilities was necessary to understand what factors primarily determine the place of a higher education institution in international and national rankings. According to L. Kloček *et al.* (2022), the study of the peculiarities of the quality of national education is built within the international context. In particular, among the key parameters, the authors name research, ensuring the implementation of innovative projects and their adaptation at the national level. However, the paper did not discuss in detail the differences between national and international rankings. Ideas for developing new digital methods for evaluating educational programmes are presented in the work by V. Pysarkova (2023). The study proposed a form of learning that would combine both online and traditional methods. The author considered gamification as one of the forms of active involvement of students in the educational process. This study focused on curriculum improvement, but other aspects of education quality were not considered. Education quality management in Ukraine was considered by N. Bakhmat *et al.* (2022) through the prism of regulation and organization of the educational process in higher education institutions. The study examined the education system within the framework of ethical principles and European standards, but did not provide a comprehensive analysis of methods and technologies for monitoring the level of educational institutions.

The development of a model for quality control of the educational process is presented in the paper by I. Koldii *et al.* (2021). In particular, the main quality indicators were identified as follows: monitoring the level of students' knowledge, methods of knowledge assessment, the possibility of practical implementation of professional skills, features of improving pedagogical skills, and the image of the educational institution. The study carried out a comprehensive analysis of the indicators of the level of education in educational institutions, but did not consider the comparison of the specifics of national and international ranking of

universities. In the monograph by S.A. Moroz (2022), the author dealt with management in the field of higher education quality assurance. In particular, a temporal and spatial analysis of the main elements of the educational system was carried out, and key generalizations were formulated regarding the provision of quality higher education and the state instruments that ensure it in Ukraine. However, the study did not compare several technologies for assessing the quality of education. The purpose of this study was to examine the methodological and technological foundations used to monitor the level of educational services in accordance with international standards. Among the national rankings, the Polish one was chosen for comparison with the Ukrainian one, given the kinship of Polish and Ukrainian higher education traditions, which were separated in the early twentieth century. In accordance with the purpose of the study, the following tasks were set: comparative analysis of the Polish and Ukrainian approach to ranking higher education institutions, a comparison of priority indicators of higher education quality in national and international higher education institutions.

MATERIALS AND METHODS

This study used the results of both international rankings: QS World University Rankings, Times Higher Education World University Rankings, and national rankings, in particular the Polish Perspektywy and the Ukrainian TOP-200 Ukraine. The analysis of the methods and technologies used to create these rankings was based on the concept of a set of indicators of higher education quality. After a detailed analysis of each system, the criteria for assessing the quality of higher education in key categories were compared.

The benchmarking analysis in this study was used to consider national and international approaches to assessing the quality of educational services. The comparison was carried out by analysing a set of key indicators and their percentage. In particular, the comparison was based on the study of key indicators of national and international rankings grouped into the following categories: prestige and reputation, quantitative and educational indicators, research activities, student employment, international perspectives and indicators, financial indicators, and technical capabilities. Thus, the comparative analysis was carried out in two directions: comparison of national and international criteria, comparison of Ukrainian and Polish experience in creating national educational rankings. Statistical analysis in this study was used to calculate the quantitative correlation between the main indicators of national and international ranking of the quality of educational services in higher education institutions. Initially, the percentage correlation between the quality indicators of higher education in accordance with the technology of creating specific rankings, including international ones, was studied: QS Top Universities, Times Higher Education World University Rankings, Polish Perspektywy and Ukrainian TOP-200 Ukraine. The evaluation was based on the following parameters: prestige

and reputation (academic reputation, teaching, prestige), quantitative and educational indicators (ratio of students per faculty, learning environment), research activities (citations in international scientific journals, research potential, research efficiency, Scopus, Webometrics, UniRank), student employment (reputation among employers, graduates in the labour market), international perspectives and indicators (international faculty coefficient, international perspective, QS World University Rankings, Times Higher Education World University Rankings), financial indicators (industry income, awards of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists, number of patents obtained by university scientists), technical capabilities (innovativeness). The results of the statistical analysis of indicators and categories of higher education quality are presented in tables and figures.

The analytical and synthetic analysis in this study was used to study the theoretical literature related to the creation of national and international systems for assessing the quality of education, the development of new strategies for ranking universities, a model of higher education sustainability, the study of the relationship between the university community and the labour market, and factors contributing to the development of the educational environment, the introduction of a system of weighting indicators, parameters of academic and non-academic education. Based on the analytical and synthetic method, the experience of different countries in improving and diversifying the quality indicators of higher education was studied to create objective national and international rankings.

RESULTS

There is no general concept of quality assurance of educational processes within the framework of international standards, but there is a need to develop a general structure of the model of quality assurance of higher education (Ryan, 2015). The methods of education quality assessment in this article are the means of studying various scientific and educational indicators from open sources (questionnaires, surveys, statistical analysis, analytical and synthetic analysis, pedagogical analysis), and the technology is a set of methods and the sequence of their use to obtain the required results. The study was based on the comparison of the percentage ratio between the criteria related to research and education, international cooperation, and financial indicators.

One of the most important technologies for assessing the quality of education in line with international standards is the QS World University Rankings, which is calculated using the methodology of the British company Quacquarelli Symonds. It was developed jointly with the British publication Times Higher Education. The volatility of the QS World University Rankings results is much lower than in other rankings, which indicates the reliability of this technology. Every year, the technology is used to evaluate 2,500 world-class higher education institutions, which is used to compile a ranking of the world's top 500 universities. It also creates rankings for individual disciplines. The QS World

University Rankings uses a statistical analysis method to assess the quality of education, and the data is taken from the largest database of scientific publications, Scopus, and a survey of representatives of academic communities around the world. The QS Global Academic Survey involves professors and university administrators with an average of 19.6 years of experience. Each of the survey participants can name 30 universities in the world, but without specifying the higher education institution where they work. The assessment was carried out in the following fields of knowledge: natural sciences, humanities and arts, social sciences, life sciences, engineering, and technology. Representatives of several thousand companies located in 90 countries took part in the QS Global Employer Survey.

The main criteria for this ranking are: academic reputation, reputation among employers, student to faculty ratio, citations, ratio of foreign teachers, ratio of foreign students, international research network, employment outcomes, and sustainability. The components of the indicators have the following quantitative ratio: academic reputation – 40%, reputation among employers – 10%, faculty student ratio – 20%, citation – 20%, international faculty ratio – 5%. Thus, this ranking shows the quantitative and qualitative correlation between all participants of the educational process: the academic community, students, parents, and employers. Figure 1 shows that the world's leading universities in the field of academic knowledge are mainly those in the US (Massachusetts Institute of Technology, Harvard University, Leland Stanford Junior University) and the UK (University of Cambridge, University of Oxford, Imperial College London, University College). The ranking of the top 15 universities also includes higher education institutions in Switzerland (ETH Zurich), Singapore (The National University of Singapore) and Australia (University of Melbourne). Among the Ukrainian universities, the list of the best includes Taras Shevchenko National University of Kyiv (681-690), V.N. Karazin Kharkiv National University (691-700) and National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (731-740), National Technical University "Kharkiv Polytechnic Institute" (901-950) and Lviv Polytechnic National University (951-1000). Among the Polish higher education institutions, the best were identified as the University of Warsaw (262), Jagiellonian University (304), Warsaw University of Technology (571), Adam Mickiewicz University (731-740), University of Life Sciences in Poznan (801-850) (QS World University..., 2024) (Fig. 1).

The Times Higher Education World University Rankings 2023 (2024) is based on the new WUR 3.0 methodology, which includes 18 key criteria for educational effectiveness, divided into 5 areas: teaching, research environment, research quality, industry, and international outlook. About 134 million citations and 16.5 million publications were analysed. The ranking includes 1906 universities from 108 countries. The main methods used to collect the necessary data were statistical analysis, sociolinguistic surveys, and the analytical and synthetic method (generalization

and systematization of data). At the same time, teaching accounts for 30% of the total score, citations (research impact) – 30%, research (volume, income, and reputation) – 30%, international perspective – 7.5%, and industry income – 2.5%. The detailed ratio is presented in Table 1. However, the Times Higher Education World University

Rankings did not include important parameters of education quality in the era of globalization and digitalization, such as providing online teaching in the context of COVID-19 and the declaration of martial law (Ma *et al.*, 2023), and determining the level of digital technology adoption (Chng & Cai, 2020).

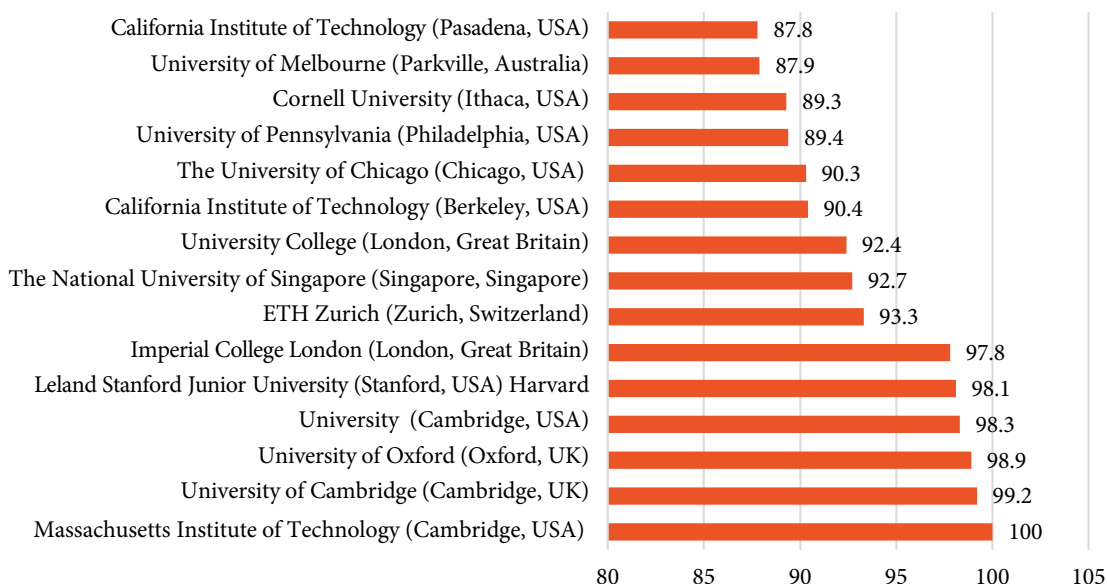


Figure 1. The best universities in 2024 according to the QS World University Rankings

Source: prepared based on QS World University Rankings 2024: Top global universities (2024)

Table 1. Correlation between the main criteria for evaluating the quality of education according to the Times Higher Education World University Rankings of 2023

The income of the industry is innovation	
Income from scientific research in industry	2.5%
International perspective (staff, students, research)	
Ratio of international and local staff	3%
The ratio between foreign and local students	2%
International cooperation	2.5%
Teaching is a learning environment	
Reputation survey	15%
Awards of doctors of philosophy	6%
Admission statistics	4.5%
Income per academician	2.25%
Awarding of Doctor of Science and Bachelor degrees	2.25%
Research — volume, revenue, and reputation	
Reputation survey	19.5%
Income from research	5.25%
Reports of scientific and pedagogical workers	4.5%
Citations — research impact	
Citation Impact (Average)	32.5%

Source: prepared given the materials of the World University Rankings 2023 (2024)

The best universities according to the Times Higher Education World University Rankings 2023 (2024) are the University of Oxford (98.5 points), Leland Stanford Junior University (98.0 points), Massachusetts Institute of Technology (97.9 points), Harvard University (97.8 points), University of Cambridge (97.5 points), Princeton

University (96.9 points), California Institute of Technology (96.5 points), Imperial College London (95.1 points), The University of California (95.1 points), Yale University (94.2 points). The best Ukrainian universities were Sumy State University (401-500), Lviv Polytechnic National University (601-800), Kharkiv National University

of Radio Electronics (1001-1200), Ivan Franko National University of Lviv (1201-1500), National Technical University “Kharkiv Polytechnic Institute” (1201-1500) and others. Among the Polish universities, the best were recognized as Wrocław Medical University (351-400), Jagiellonian University (601-800), Medical University of Łódź (601-800), Medical University of Gdańsk (801-1000), University of Warsaw (801-1000).

The annual Ukrainian university ranking “TOP-200 Ukraine” has been developed for 17 years by the Centre for International Projects “Euroeducation” and the international group of experts IREG Observatory on Academic Ranking and Excellence. It is worth noting that the 2023 ranking took into account important trends in Ukraine’s development after the full-scale invasion of the Russian Federation and the consequences of the COVID-2019 pandemic. The basis for this ranking were the results of the international conferences IREG 2022 (Warsaw Conference: “Academic Rankings at the Crossroads”, 23-24 June 2022), IREG 2023 (Tashkent-Samarkand Conference: “Rankings and University International Exposure”, 26-28 April 2023) and the Berlin Principles on Ranking of Higher Education Institutions (2006), approved by the participants of the second IREG meeting (Berlin, Germany, 18-20 May 2006). The study is based on the Delphi method, which involves systematic collection of information for forecasting the situation based on expert interviews and data synthesis.

Ukrainian higher education institutions were evaluated according to 6 international and 4 national criteria. The international indicators include the following: QS World University Rankings, Times Higher Education World University Rankings – academic activity, Scopus – research and publishing activity, Webometrics – assessment of scientific achievements by monitoring websites, Times Higher Education (THE) University Impact Rankings – achievements of higher education institutions (HEIs) in the context of the 17 United Nations Sustainable Development Goals (UN Sustainable Development Goals) – quality of presentation and popularity of HEIs in the Internet space based on independent webometric indicators.

Among the national criteria, the following were taken into account: the effectiveness of participation of Ukrainian HEIs in competitions of scientific projects (international and Ukrainian), awards of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists (educational and scientific work), the number of patents obtained by university scientists (inventive activity), the weighted average for the ratings of HEIs by the number of applications submitted by applicants and the average competitive score (attractiveness of the university for applicants). We took into account data that was publicly available and whose validity could be verified. The sum of all the weighting factors was equal to 1, and the resulting ranking was defined as the inverse of the University Index (Fig. 2).

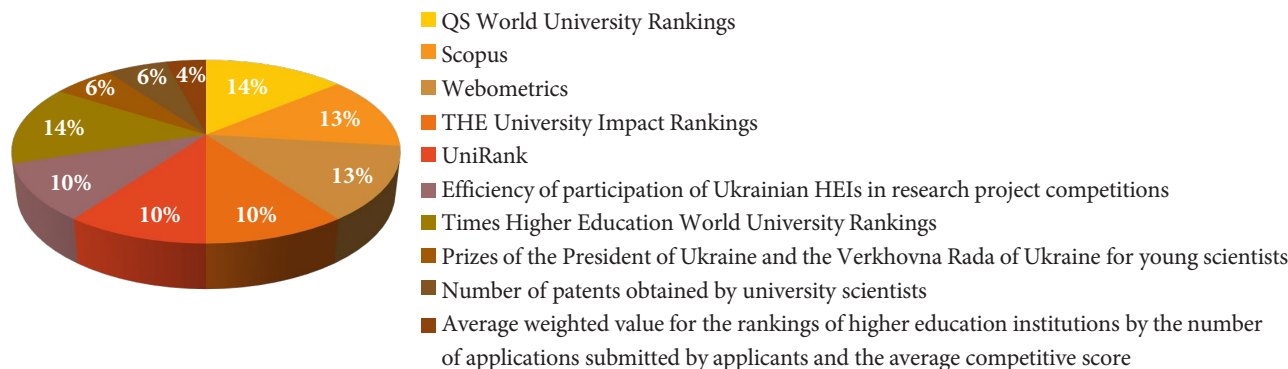


Figure 2. Weight of indicators according to Times Higher Education World University Rankings (2023)

Source: prepared based on QS World University Rankings 2024: Top global universities (2024)

The top ten universities are as follows: National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” (sum of indices – 4.09), Taras Shevchenko National University of Kyiv (4.46), V.N. Karazin Kharkiv National University (5.61), Lviv Polytechnic National University (5.62), Ivan Franko National University of Lviv (5.95), Sumy State University (5.97), National Technical University “Kharkiv Polytechnic Institute” (6.98), National University of Life and Environmental Sciences of Ukraine (9.59), Kharkiv National University of Radio Electronics (9.94), Yuriy Fedkovych Chernivtsi National University (10.72).

The Perspektywy Educational Foundation is engaged in the ranking of higher education institutions in Poland, in particular, separate rankings are created for public, private

higher education institutions and state vocational schools. The main methods used were statistical analysis, pedagogical analysis, analytical and synthetic method, and survey method. The indicators for determining the ranking of public institutions were grouped by the following parameters: prestige, graduates in the labour market, scientific potential, innovation, scientific efficiency, learning environment, internationalization. The quantitative expression of the indicators is shown in Figure 3. According to these indicators, the best higher education institutions were identified as Jagiellonian University (100), University of Warsaw (99.6), Warsaw University of Technology (88.0), Adam Mickiewicz University (83.6), Kraków Scientific and Technical University named after S. Stashitsa (83.1) (Rating of higher..., 2024).

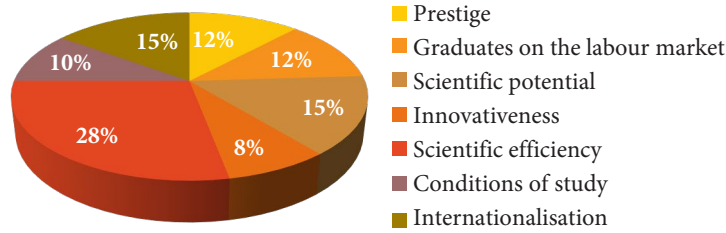


Figure 3. Technology for calculating the rating of academic universities for 2023

Source: prepared based on the materials of Perspektywy (Rating of higher ..., 2024)

The prestige criterion includes two main parameters: the assessment of the teaching staff based on the CAWI survey and international recognition. The level of a higher education institution in terms of graduates' placement in the labour market shows their earnings relative to the average earnings in the area of residence and the possibility of employment (according to a national survey). The scientific potential consists of indicators such as the evaluation of scientific activities, the saturation of the staff with people of the highest qualification, habilitation qualifications, and doctoral qualifications. Innovativeness is focused on the number of patents and protection rights in Poland, patents, and protection rights abroad, and the contribution of university research to the implementation of the UN Sustainable Development Goals. Scientific effectiveness includes a number of parameters: the effectiveness of attracting financial resources for research, development of own personnel,

degrees awarded, publications, Field-Weighted Citation Impact (FWCI), Field-Weighted View Impact (FWVI), top 10 (publications in the top 10 percentile journals).

The training conditions include two parameters: availability of highly qualified staff and accreditation. The internationalization parameter includes numerous criteria: the number of students studying in foreign languages, foreign teachers, exchange of academic staff (trips) under the Erasmus+ programme, strategic partnership projects in which the university is a leader under the Erasmus+ programme, student exchange, multiculturalism of the student environment. For non-public institutions, the main criteria are prestige, graduates in the labour market, scientific strength, educational potential, innovation and economic cooperation, internationality (Fig. 4), and for public vocational institutions – prestige, graduates in the labour market, educational potential, economic cooperation, internationality (Fig. 5).

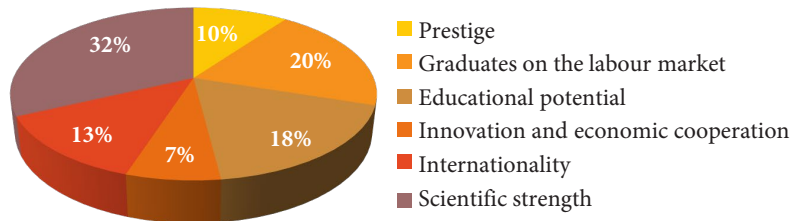


Figure 4. Technology for calculating the rating of private universities in Poland for 2023

Source: prepared based on the materials of Perspektywy (Rating of higher ..., 2024)

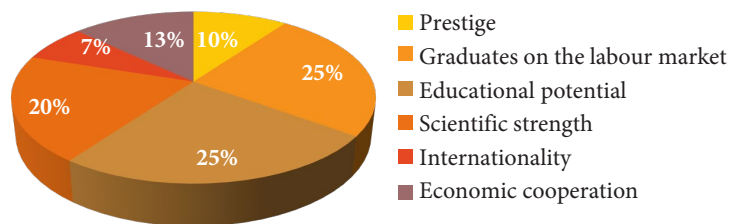


Figure 5. Technology for calculating the rating of professional higher education institutions in Poland for 2023

Source: prepared based on the materials of Perspektywy (Rating of higher ..., 2024)

International rankings with ready-made citation results are used to evaluate higher education institutions in Ukraine: Webometrics, Scopus, UniRank, and general scientific and educational achievements: QS World University Rankings, THE University Impact Rankings, and national indicators (participation in research project competitions,

number of patents obtained, ratio between the number of applications and the competition score, number of awards for young scientists), a total of 10 indicators. When determining key indicators for monitoring the quality of educational services, it would be advisable to consider the academic performance indicator, not just quantitative

indicators (the ratio between students and teachers) (Buza & Istrate, 2022). When determining the ranking of Polish universities, the number of criteria was higher (29 indicators), divided into groups: prestige, scientific strength, scientific potential, scientific efficiency, educational potential, innovation, internationalization, graduates on the labour market, economic cooperation, and learning environment. It is important to note that specific international rankings with ready-made figures were not considered in Poland, as in the Ukrainian ranking, although international cooperation was an important component of the calculation in both cases. It is worth noting that in the Polish ranking, some groups of indicators were not formulated clearly

enough and could be duplicated (“scientific strength”, “scientific efficiency”). One of the ways to improve the quality of Polish education is to reform higher education institutions in the direction of increasing autonomy in each university (Urbanek, 2018).

Table 2 presents the percentage correlation between the key parameters of international standards, as well as Ukrainian and Polish technologies for calculating the percentage correlation between national and international indicators. The indicators were grouped by prestige and reputation, quantitative and educational indicators, research activities, student employment, international prospects, financial indicators, and technical capabilities.

Table 2. Ratio of indicators of international standards for Ukrainian and Polish technologies

Indicator	QS World University Rankings	Times Higher Education World University Rankings	“TOP-200 Ukraine” (“Euroeducation”, Ukraine)	Perspektywy (Poland)
Prestige and reputation				
Academic reputation	40%			
Teaching		30%		
Prestige			12%	
In total	40%	30%	12%	
Quantitative and educational indicators				
The ratio of students of the faculty	20%			
The weighted average value for the ratings of higher education institutions by the number of applications submitted by applicants and the average competitive score				4%
Study conditions			10%	
In total	20%		10%	4%
Research activities				
Citation	20%	30%		
Research		30%		
Scientific potential			15%	
Scientific efficiency			28%	
Effectiveness of participation of higher education institutions of Ukraine in competitions of scientific projects				6%
Scopus				14%
Webometrics				14%
UniRank				10%
In total	20%	60%	42%	42%
Employment of students				
Reputation among employers	10%			
Graduates on the labour market			12%	
In total	10%		12%	
International perspectives and indicators				
The ratio of international teachers	5%			
International perspective		7.5%		
Internationality				
QS World University Rankings				15%
THE University Impact Rankings				10%
Times Higher Education World University Rankings				15%
In total	5%	7.5%		40%

Table 2. Continued

Indicator	QS World University Rankings	Times Higher Education World University Rankings	“TOP-200 Ukraine” (“Euroeducation”, Ukraine)	Perspektywy (Poland)
Financial indicators				
Industry income		2.5%	15%	
Prizes of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists				6%
The number of patents received by university scientists				6%
In total		2.5 %	15%	12%
Technical capabilities				
Innovativeness			8%	
In total			8%	

Source: prepared from materials Ranking of universities of Ukraine “TOP-200 Ukraine” (2023), Rating of higher educational institutions (2024), World University Rankings 2023 (2024), QS World University Rankings 2024: Top global universities (2024)

For the QS World University Rankings (2024), prestige and reputation were the most important (40%), for the Times Higher Education University Impact Rankings 2023 (2023) – research (60%), for the TOP-200 Ukraine (Ranking of universities..., 2023) – research (42%), for the Polish Perspektywy (Rating of higher..., 2024) – research (42%) and international prospects (40%). It is worth noting that the growth of international cooperation between universities has a positive impact on the exchange of educational experience and allows university graduates to expand their job search opportunities in the international labour market, which generally leads to a gradual increase in the efficiency of educational services (Grudowski & Szczepańska, 2021). Quantitative and educational indicators and employment indicators were considered most of all in the QS World University Rankings, TOP-200 Ukraine, financial indicators – in Perspektywy, technical capabilities – in TOP-200 Ukraine. Since higher education institutions in the context of globalization are constantly in need of technological innovations in the educational sphere, there is a gradual increase in the need to monitor the technical capabilities of universities (Bullock & Ory, 2000).

Thus, when comparing national (Ukrainian, Polish) and international experience in creating rankings, it was shown that there are no clearly defined criteria for assessing the quality of education, and they differ significantly from each other. However, when comparing Ukrainian and Polish rankings, in Ukraine, international criteria are more important than national ones, while in Poland, both national and international indicators are considered equally. In other words, the Ukrainian system of education quality assessment is a combination of several international assessments, and national criteria have much lower weighting.

DISCUSSION

This paper analyses the key indicators used by national and international education quality assessment systems, in particular, for creating rankings. The main indicators of the quality of education were divided into the following

groups: prestige and reputation, quantitative and educational indicators, research activities, student employment, international perspectives and indicators, financial indicators, and technical capabilities. According to A.A. Makki *et al.* (2023), meeting the criteria of international rankings may not lead to the achievement of certain strategic goals of a higher education institution. This study was about developing a new approach to assessing the quality of education based on a combination of international ranking systems and the achievements of national universities in relation to their strategic goals. The study showed that national rankings take into account both national and international evaluation criteria. For example, the Ukrainian higher education ranking “TOP-200 Ukraine” is based on a combination of 6 international and 4 national criteria, which allows for an objective assessment of the performance of educational institutions both in Ukraine and abroad.

The higher education sustainability model, developed by C. Cao *et al.* (2023), was tested in nine countries using 13 indicators of education quality and sustainability. By analysing these parameters, the authors show that each educational system has its own advantages, in particular, Australian higher education institutions are characterized by a high level of academic integrity, British ones by sustainability and prestige, and American ones by numerous patents per capita. Based on the study of educational indicators of Ukrainian education, it is possible to trace high indicators of technological sophistication of the educational process, the ratio of students to teachers, and scientific potential, but the level of international cooperation and citations in international journals is lower than in other European countries.

When studying the factors that contribute to the development of the educational environment, N.Y. Dwaiyat (2021) came to the following conclusions: input-based factors have a stronger impact on output-based factors, and process-based factors have less of an impact on output-based factors. Therefore, factors such as international pedagogical standards, educational infrastructure and

learning environment have a significant impact on parameters such as student quality and teacher quality, as well as on the quality of academic programmes. When analysing the Ukrainian quality of education in the context of international standards, the following interrelated factors were identified: in particular, academic reputation is influenced by the ratio of foreign students, citations, and student employment rates. It should be noted that the national ranking of Ukraine was significantly influenced by the results of international rankings, in particular QS World University Rankings, THE University Impact Rankings, THE World University Rankings. It can be concluded that the assessment of the quality of education in national states is significantly influenced by international indicators.

The development of a methodology for assessing the quality of education of higher education institutions and their ranking in the work by Z. Lazis *et al.* (2021) was based on a survey of stakeholders and the identification of quantitative indicators of the effectiveness of the educational process. According to the authors, the ranking systems of educational institutions should be based on weighting coefficients. The weighting system was successfully used to create the TOP-200 Ukraine ranking. However, the national ranking of Polish educational institutions and international rankings used a percentage ratio between different criteria for evaluating higher education institutions. Thus, the methodology of weighting coefficients is not yet a priority in the international context. Another study suggests the priority of using weighting indicators for attributes and sub-attributes that are included in the list of important educational indicators. In the study by K.F. See *et al.* (2022), the following observation was presented: in developing countries, funding is a priority for the development of education, while in developed countries, strengthening international relations, communication in academic circles and practical application of theoretical ideas are prioritized. It was also pointed out that Asian countries also tend to follow Western priorities in education. The analysis of Ukrainian and Polish educational rankings shows the importance of internationalization, economic cooperation, and increasing citations in scientific databases, i.e. they are focused on increasing the international community's interest in the scientific work of national educational institutions. However, the Polish ranking of educational institutions includes more national indicators, while the Ukrainian ranking is more focused on international rankings and the assessment of Ukrainian educational institutions in the world.

Since the basis of quality education is primarily the level of teaching, H. Wu (2023) expanded and described the technology for researching the quality of learning based on big data. The absolute difference between the author's algorithm and the existing ones was 18.23 %. The author noted such problems in assessing the quality of education as the lack of feedback monitoring, common evaluation criteria and the use of the most accessible methods to determine the level of an educational institution. Based on the analysis of the Ukrainian experience of creating a ranking of higher

education institutions, the following problems can be noted: the use of the results of several international rankings leads to duplication of many criteria, and the focus on international standards leads to neglect of certain national criteria. At the same time, international rankings also differ significantly in the number and priority of criteria, which hinders the objective ranking of higher education institutions in the world. The analysis of the quality of higher education in Romania is devoted to the article by S. Stanciu & V. Banciu (2012), in particular, the article deals with the relationship between university communities and the labour market. The paper examined issues related to students' readiness for practical work and the development of strategies to increase students' social participation in the labour market. Thus, the authors' research focused on the analysis of the student employment parameter. Comparison of international and national rankings showed that the employability criterion is not a priority and accounts for only 10-12% of the result. Compared to the parameters of citation, internationalization, and academic reputation, this criterion is not a priority for determining the university ranking.

The theoretical understanding of the key concepts, methods, strategies, and structure of higher education is discussed in the article by M. Kayyali (2023). The author's work focuses on the study of academic and non-academic parameters of education quality assessment, identification of priority strategies for internal control of educational institutions aimed at curriculum development and teacher development. Regional differences and the importance of international initiatives were also studied. A comparative analysis of the creation of national and international rankings has shown that the highest priority parameters are research activities and academic reputation, i.e. academic criteria. At the same time, much less attention is paid to non-academic criteria. It should be noted that the researcher's strategy is appropriate from the point of view that it is the non-academic parameters that relate to the practical implementation of the theoretical knowledge gained.

An analysis and synthesis of modern approaches to the study of national and international experience is presented in the work by O. Vorobyova *et al.* (2020). The study focuses on indicators and criteria for the quality of higher education, as well as on the identification of assessment mechanisms in different countries. In particular, such issues as the application of the rating system at the global and regional levels, tools for the internationalization of higher education, and the social responsibility of the university were considered. The results of the study of Ukrainian and international experience in creating rankings showed that national evaluation mechanisms are built in accordance with international standards. However, it is important to pay attention to national indicators that demonstrate the effectiveness of education in a particular country, based on globally accepted criteria. Thus, the bulk of modern pedagogical research on education quality assessment has focused on issues related to the development of new strategies for ranking higher education institutions, and the

identification of key indicators that should be included to objectively determine the level of education quality. Another important issue is the correlation between national and international indicators used to create rankings. In general, based on the research, it is possible to note the priority of international standards in creating national rankings.

CONCLUSIONS

Among the methods used to assess the quality of education in higher education institutions were statistical, pedagogical analysis, analytical and synthetic method, questionnaires, and surveys. The results of the statistical analysis showed that the correlation between national and international criteria for determining the quality of education by different technologies is as follows. The group of indicators that had the greatest impact was scientific activity (citations in webometric databases, research, scientific potential, scientific efficiency). In particular, according to a set of criteria, scientific activity was used as the basis for evaluation in three rankings: THE University Impact Rankings (60%), TOP-200 Ukraine (42%), and Perspektywy (42%). The indicators of the category “prestige and reputation” had the greatest weight for international rankings (QS World University Rankings, THE University Impact Rankings). Indicators related to increasing the authority of higher education institutions among the international community had the highest coefficient in the Perspektywy ranking (Poland). For the Ukrainian TOP-200 Ukraine ranking, financial indicators and technical capabilities were important factors.

When comparing Ukrainian and Polish experience, it was found that 6 international (Webometrics, Scopus, UniRank, QS World University Rankings, Times Higher Education World University Rankings, THE University Impact Rankings) and 4 national (participation in research project competitions, the ratio between the number of applications and the competition score, the number of patents obtained, the number of awards for young scientists) criteria, and the Polish ranking took into account as many as 29 indicators, which were divided into several groups: prestige, scientific potential, scientific efficiency, scientific strength, educational potential, internationalization, innovativeness, graduates on the labour market, study conditions, economic cooperation. In general, the results of the analysis of the ranking in Poland showed a balance between national and international criteria, while the ranking in Ukraine was based on about 70% of international criteria and 30% of national criteria.

The priority areas for further research will be to study key criteria and improve technologies for creating national and international rankings, form a unified system for assessing the quality of education, and introduce new concepts of education quality based on the experience of different countries.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

References

- [1] Bakhmat, N., Voropayeva, T., Artamoshchenko, V., Kubitskiy, S., & Ivanov, G. (2022). Quality management in higher education in terms of sustainable development. *International Journal for Quality Research*, 16(4), 1107-1120. doi: 10.24874/IJQR16.04-10.
- [2] Berlin Principles on Ranking of Higher Education Institutions. (2006). Retrieved from <https://eurosvita.net/prog/data/doc/BerlinPrinciples.pdf>.
- [3] Bullock, C., & Ory, J. (2000). Evaluating instructional technology implementation in a higher education environment. *The American Journal of Evaluation*, 21(3), 315-328. doi: 10.1016/S1098-2140(00)00087-4.
- [4] Buza, V., & Istrate, M. (2022). Equality and quality in education. A multidimensional analysis of the results of the 2021 national assessment examination in the north-east region, Romania. In *International Scientific Conference GEOBALCANICA* (pp. 289-301). Belgrade: Geographical Institute “Jovan Cvijic”. doi: 10.18509/GBP22289b.
- [5] Cao, C., Wei, T., Xu, Sh., Su, F., & Fang, H. (2023). Comprehensive evaluation of higher education systems using indicators: PCA and EWM methods. *Humanities and Social Sciences Communications*, 10, article number 432. doi: 10.1057/s41599-023-01938-x.
- [6] Chng, E., & Cai, S. (2020). Methods for evaluating the adoption and use of digital technologies in GLAMs. *MethodsX*, 7, article number 100559. doi: 10.1016/j.mex.2019.05.015.
- [7] Dwaikat, N.Y. (2021). A comprehensive model for assessing the quality in higher education institutions. *The TQM Journal*, 33(4), 841-855. doi: 10.1108/TQM-06-2020-0133.
- [8] Grudowski, P., & Szczepańska, K. (2021). Quality gaps in higher education from the perspective of students. *Foundations of Management*, 13, 35-48. doi: 10.2478/fman-2021-0003.
- [9] Impact Rankings 2023. (2023). Retrieved from <https://www.timeshighereducation.com/impactrankings/>.
- [10] Kayyali, M. (2023). [An overview of quality assurance in higher education: Concepts and frameworks](#). *International Journal of Management, Sciences, Innovation, and Technology (IJMSIT)*, 4(2), 1-4.
- [11] Klochek, L., Snitsarchuk, L., & Ohar, E. (2022). The system for assessing the quality of education in the universities of the leading countries of the world. *Times and Spaces in Education Magazine*, 15(34), article number e17086. doi: 10.20952/revtee.v15i34.17086.

- [12] Kolodii, I., Kostolovych, T., Kolomiets, T., Muratova, I., & Tsoi, M. (2021). Ensuring quality control of educational activities of higher educational institutions. *Magazine Laplage*, 7(3B), 292-300. doi: [10.24115/S2446-6220202173B1549p.292-300](https://doi.org/10.24115/S2446-6220202173B1549p.292-300).
- [13] Lazic, Z., Dordevic, A., & Gazizulina, A. (2021). Improvement of quality of higher education institutions as a basis for improvement of quality of life. *Sustainability*, 13(8), article number 4149. doi: [10.3390/su13084149](https://doi.org/10.3390/su13084149).
- [14] Ma, Y.Y., Lin, C.L., & Lin, H.L. (2023). Ranking of service quality index and solutions for online English teaching in the post-COVID-19 crisis. *Mathematics*, 11(18), article number 4001. doi: [10.3390/math11184001](https://doi.org/10.3390/math11184001).
- [15] Makki, A.A., Alqahtani, A.Y., Abdulaal, R.M.S., & Madbouly, A.I. (2023). A novel strategic approach to evaluating higher education quality standards in university colleges using multi-criteria decision-making. *Education Sciences*, 13(6), article number 577. doi: [10.3390/educsci13060577](https://doi.org/10.3390/educsci13060577).
- [16] Moroz, S.A. (2022). *Quality assurance of higher education: mechanisms of management and practical use*. Lviv: Novyi Svit-2000.
- [17] Pysarkova, V. (2023). New approaches to assessing the quality of educational activities at universities in the context of digitalization of the economy and increasing labor market requirements. *Human Resources Management and Services*, 5(2), article number 3380. doi: [10.18282/hrms.v5i2.3380](https://doi.org/10.18282/hrms.v5i2.3380).
- [18] QS World University Rankings 2024: Top global universities. (2024). Retrieved from <https://www.topuniversities.com/world-university-rankings?search=Kyiv/>.
- [19] Ranking of universities of Ukraine “TOP-200 Ukraine”. (2023). Retrieved from <https://euroosvita.net/index.php/?category=1&id=7923>.
- [20] Rating of higher educational institutions. (2024). Retrieved from <https://2023.ranking.perspektywy.org/ranking/university-ranking>.
- [21] Ryan, P. (2015). Quality assurance in higher education: A review of literature. *Higher Learning Research Communications*, 5(4). doi: [10.18870/hlrc.v5i4.257](https://doi.org/10.18870/hlrc.v5i4.257).
- [22] See, K.F., Ng, Y.C., & Yu, M.M. (2022). An alternative assessment approach to national higher education system evaluation. *Evaluation and Program Planning*, 94, article number 102124. doi: [10.1016/j.evalprogplan.2022.102124](https://doi.org/10.1016/j.evalprogplan.2022.102124).
- [23] Stanciu, S., & Banciu, V. (2012). Quality of higher education in Romania: Are graduates prepared for the labour market? *Procedia – Social and Behavioral Sciences*, 69, 821-827. doi: [10.1016/j.sbspro.2012.12.004](https://doi.org/10.1016/j.sbspro.2012.12.004).
- [24] Urbanek, P. (2018). Reform of the higher education system in Poland from the perspective of agency theory. *European Journal of Higher Education*, 10(2). doi: [10.1080/21568235.2018.1560344](https://doi.org/10.1080/21568235.2018.1560344).
- [25] Vorobyova, O., Debych, M., Lugovii, V., Orzhel, O., Slyusarenko, O., Talanova, Zh., & Tryma, K. (2020). *Mechanisms for evaluating the quality of higher education in the context of European integration*. Kyiv: Institute of Higher Education of the National Academy of Sciences of Ukraine. doi: [10.31874/978-617-7486-38-0-2020](https://doi.org/10.31874/978-617-7486-38-0-2020).
- [26] World University Rankings 2023. (2023). Retrieved from <https://www.timeshighereducation.com/world-university-rankings/2023/world-ranking>.
- [27] Wu, H. (2023). Higher education environment monitoring and quality assessment model using big data analysis and deep learning. *Journal of Environmental and Public Health*, 2022, article number 7281278. doi: [10.1155/2022/7281278](https://doi.org/10.1155/2022/7281278).

Микола Петрович Матківський

Кандидат технічних наук, доцент

Прикарпатський національний університет імені Василя Стефаника

76018, вул. Шевченка, 57, м. Івано-Франківськ, Україна

<https://orcid.org/0000-0001-5039-0260>

Тетяна Миколаївна Тарас

Кандидат хімічних наук, доцент

Прикарпатський національний університет імені Василя Стефаника

76018, вул. Шевченка 57, м. Івано-Франківськ, Україна

<https://orcid.org/0000-0002-5801-1285>

Методи та технології оцінювання якості вищої освіти в контексті міжнародних стандартів: порівняння українського та польського досвіду створення рейтингів

Анотація. Необхідність дослідження методів та технологій, що використовуються для оцінювання рівня надання освітніх послуг, зумовлена передусім постійними трансформаціями в освітніх процесах, удосконаленням системи критеріїв, за якими здійснюється ранжування вищих навчальних закладів. Метою цього дослідження стало проведення аналізу використаних інструментів для оцінювання роботи вищих навчальних закладів в умовах міжнародної стандартизації освітніх процесів. Основні методи, які використовувалися в дослідженні: статистичний аналіз, порівняльно-зіставний та аналітико-синтетичний методи. У ході порівняльно-зіставного аналізу було виявлено, що серед основних показників, які впливали на створення рейтингів, були наукова діяльність: Times Higher Education University Impact Rankings (60 %), "TOP-200 Ukraine" (42 %), Perspektywy (42 %) та престиж і репутація: QS World University Rankings (40 %), Times Higher Education University Impact Rankings (30 %), "TOP-200 Ukraine" (12 %). Серед методів, які застосовувалися для створення рейтингів, були статистичний, педагогічний аналіз, аналітико-синтетичний метод, опитування. Для створення українського рейтингу бралось 6 міжнародних (Webometrics, Scopus, Times Higher Education World University Rankings, Times Higher Education University Impact Rankings, UniRank, QS World University Rankings) і 4 національних (участь у конкурсах наукових проєктів, кількість отриманих патентів, премій для молодих учених, співвідношення між кількістю заяв абітурієнтів та конкурсним балом) показники. Польський рейтинг було засновано на 29 показниках, розподілених за групами: престиж, наукова ефективність, наукова сила, науковий та освітній потенціал, інтернаціоналізація, випускники на ринку праці, інноваційність, умови навчання, економічна співпраця. У Польщі спостерігався баланс між міжнародними та національними критеріями, а в Україні використовувалося близько 70 % міжнародних критеріїв та 30 % національних критеріїв. Цю роботу можна використовувати в подальшому для вдосконалення національних та міжнародних систем оцінювання якості вищої освіти, розробки єдиного механізму для створення рейтингів

Ключові слова: престиж; вагові показники; наукова діяльність; національний досвід