

## COMPARATIVE ANALYSIS OF ECONOMIC DEVELOPMENT AND MODELS BY THE STATE SUPPORT OF HIGHER MEDICAL EDUCATION AND THEIR INSTITUTIONS

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**Abstract:** The article compares economic development and offers models of state support for higher medical education and its institutions, describes several approaches to assessing the competitiveness of higher medical institutions, namely: international and national rating assessment, assessment of the competitive position of higher education in relation to the most influential competitor, the market of educational services and rating assessment of the activity of individual employees and structural subdivisions of medical educational institutions. Based on the qualimetric approach, the competitiveness of the institution of higher medical education was assessed. The main evaluation criteria for compiling international and national rankings of higher medical education institutions have been identified. Levels of practical value of use of a complex technique of definition of competitiveness of establishment of higher medical education are formed. Proposals are made for the formation of a comprehensive methodology for assessing the competitiveness of higher medical education on the basis of a single system of regulatory indicators of higher education and methods of measuring the results of educational, scientific, international and personnel work of medical institutions in higher education.

**Keywords:** Competitiveness, Competitive position, Economic development, Educational services, Higher education institution, International and national ratings, Models of state support, Rating assessment.

### 1 Introduction

According to the draft Strategy for the Development of Medical Education in Ukraine, which provides for "building a quality system of medical education to ensure the health professionals with a high level of training", the issues of methodological support for assessing the competitiveness of higher medical education are of high relevance. In this Strategy, one of the areas of solving the problems of the industry is the internationalization of medical education, which involves the intensification of international activities ZVMO, ensuring the academic mobility of students, the involvement of foreign teachers. Qualitative characteristics of these processes depend on the competitive position of a particular medical institution and at the same time affect its competitiveness.

Problems and directions of formation of higher education institutions' competitiveness are the object of scientific research of many domestic and foreign scientists. At the same time, most of them pay attention to the advantages, disadvantages, and prospects of further development of ranking technologies of educational institutions, including O. Pryadko, I. Tarasov, O. Shurigin [23], O. Khyzhnyak [14], K. Khoroshchak [13], K. Chernobay [6], and others.

The experience of introducing rating assessment of the results of teachers and individual departments of educational institutions is covered in the publications of T. Boychuk, I. Gerush, E. Tkach, V. Khodorkovsky [5, 6]. The issue of increasing the competitiveness of higher education institutions and educational services is considered in the scientific works of J. Horyn, O. Senyshyn [8, 9], N. Konstanyuk [15], and others. A systematic approach to assessing the competitiveness of medical health care on the basis of analysis of the influence of external and internal

factors is covered in the publications of Russian scientists I. Artyukhov, A. Shulmin, I. Averchenko, E. Kozlov [3]. However, there is now a need to develop a comprehensive methodology for assessing the competitiveness of higher medical education, which would include indicators for assessing the competitive position of free economic education at both national and international levels based on the achievements of individual teachers, departments, and faculties.

### 2 Materials and Methods

#### 2.1 Study of Leading International Rankings of Higher Education Institutions

Competitiveness of higher education institutions should be understood as their ability to successfully sell educational services and research results and, thus, attract funds from foreign and domestic students, R&D customers, buyers of patents, grantors, as well as public funding in the form of public procurement, training of specialists in a certain field of knowledge [10, 12].

Without sufficient funding for the activities of the educational institution, given the speed of technological change and the constant growth of requirements for the quality of educational services, its development is currently impossible [7, 11, 18]. One of the approaches to assessing the competitiveness of higher education institutions is to compile international, national, and regional rankings.

The history of international rankings of educational institutions is over 150 years old. In 1863, Karel František Edvard Rytif Kořistka, a surveyor, geographer, and engineer, published Higher Polytechnic Studies in Germany, Switzerland, France, Belgium, and England, in which one of the first attempts to rank higher education institutions was made [16]. At the end of the twentieth century, more and more countries and organizations became involved in this process. National, regional, and international rankings are made today in the USA, Great Britain, Canada, Poland, Germany, France, Ukraine, a number of Asian countries.

The most authoritative today are the following global rankings: World Universities Rankings, QS World University Rankings, Academic Ranking World Universities, Best Global Universities Rankings and Ranking Web or Webometrics, the main characteristics of which are given in Table. 1.

Table 1: Characteristics of the leading international rankings of higher education institutions

Rating name	Compilers (country)	Description, main goal	Thematic groups	Evaluation indicators, weights
1	2	3	4	5
The World University Rankings	British publishing house Times Higher Education (THE)	Provides detailed information on the performance of university activities in all major areas, as well as allows comparing higher education institutions with other institutions by region, subject, and other key criteria	1. Life sciences. 2. Clinical, pre-clinical & health. 3. Physical sciences. 4. Psychology. 5. Engineering & technology. 6. Computer Science. 7. Law. 8. Arts & humanities. 9. Business & Economics. 10. Social sciences. 11. Education.	Teaching – 30%, Research – 30%, Citations – 30%, International outlook – 7,5%, Industry income – 2,5%

<p>Academic Ranking of World Universities</p>	<p>World-class university center (CWCUC), Higher School of Education (formerly the Institute of Higher Education) of Shanghai Jiao Tong University, China</p>	<p>The ranking evaluates the scientific and academic performance of higher education institutions in order to reduce the impact of national education systems on the final grade. More than 1,200 higher education institutions are involved in the study and only 500 are included in the list of the best universities in the world.</p>	<p>1. Natural sciences and mathematics (SCI), in particular mathematics, physics, chemistry, meteorology, earth sciences, planetary sciences. 2. Engineering/Informatics (ENG), in particular, mechanisms, electrical sciences, general construction science, chemical industry, materials science, informatics, etc. 3. Life and agricultural sciences (LIFE), in particular, biology, biomedicine, agronomy, and environmental science. 4. Clinical Medicine and Pharmacy (MED), including clinical medicine, dentistry, patient care science, public health, veterinary medicine, pharmacology, etc. 5. Social sciences (SOC), including economics, sociology, political science, law, education, management, etc.</p>	<p>Graduates – Nobel or Fields Prize winners - 10%, Nobel or Fields Prize winners – 20%, citation rate of researchers in 21 categories – 20%, articles published in the journals Nature or Science – 20%, citation indices for natural sciences and humanities Sciences of the Institute of Scientific Information, Science Citation Index and Social Sciences Citation Index, as well as indices of leading journals Arts and Humanities Citation Index – 20%, the total result of previous indicators in relation to the number of staff of higher education institutions – 10%</p>
<p>QS World University Rankings</p>	<p>British consulting company Quacquarelli Symonds (QS)</p>	<p>Combining statistical analysis of educational institutions, audited data, data from a global expert survey of representatives of the international academic community and employers. More than 2,500 educational institutions around the world are evaluated, of which 500 are included in the ranking</p>	<p>1. Natural sciences. 2. Social sciences. 3. Humanities and arts. 4. Life sciences. 5. Engineering sciences and technologies</p>	<p>Reputation in the academic environment – 40%, citations of scientific publications of university representatives – 20%, the ratio of teachers to students – 20%, the attitude of employers to graduates – 10%, the relative number of foreign teachers and students – 5%</p>
<p>Best Global Universities Rankings</p>	<p>U.S. News &amp; World Report – American News Magazine, Washington</p>	<p>The ranking is based on 13 indicators that measure the results of research of educational institutions and their global and regional reputation</p>	<p>1. Agricultural sciences. 2. Biology and biochemistry. 3. Chemistry. 4. Clinical medicine. 5. Environment / ecology. 6. Earth sciences. 7. Immunology. 8. Materials science. 9. Microbiology. 10. Molecular biology and genetics</p>	<p>Global research reputation - 12.5%, regional research reputation – 12.5%, number of publications – 10%, number of books – 2.5%, conferences – 2.5%, standardized citation level – 10%, total citations – 7.5%, the number of publications included in the 10% of the most cited – 12.5%</p>

<p>Best Global Universities Rankings</p>	<p>U.S. News &amp; World Report – American News Magazine, Washington</p>	<p>Applicants can use these rankings to explore higher education options that exist outside their own countries and to compare key aspects of school research missions.</p>	<p>1. Neurology and behavioral sciences. 2. Pharmacology and toxicology. 3. Physics. 4. Botany and zoology. 5. Psychiatry / psychology. 6. Space sciences. 7. Informatics. 8. Economics and business. 9. Mathematics. 10. Engineering sciences. 11. Social sciences and sciences related to health care. 12. Arts and humanities</p>	<p>The share of publications included in the top 10% of cited – 10%, international cooperation in publications – 5%, the number of highly cited publications over a 10-year period – 5%, the ratio of the number of highly cited publications to the total number of university publications – 5%, share of publications with foreign co-authors – 5%</p>
<p>Ranking Web or Webometrics</p>	<p>Cybermetrics Lab (Spanish National Research Council, CSIC)</p>	<p>Educational institutions compare the degree of content of their official websites. This is summing up not quantitative values of indicators, and rank (places of concrete establishment of higher education in ranking on each of four indicators of a rating)</p>	<p>–</p>	<p>Size (S) – the number of pages of the site covered by search engines – 25%. Visibility (V) – the number of unique external links to site pages – 50%. Rich Files (R) – the number of “valuable” files posted on the site – 12.5%. Scholar (Sc) – number of pages and links to the school’s website – 12.5%</p>

Source: compiled by the authors using [2, 20, 21, 24, 26].

According to the methodology of World University Rankings, the rating is determined by 13 parameters (indicators), each of which has its own weight (percentage of the total score). The indicators are grouped into five categories. Participation in the ranking for educational institutions is voluntary and free. To participate, the educational institution must provide the responsible compilers with an application and the necessary information in advance [1]. According to experts, the Times Higher Education rating is assessed only by those universities that are engaged in science [13].

The Academic Ranking of World Universities (ARWU) was first published in June 2003 by the World Class University Research Center (CWCUC) of the Academy of Higher Education (formerly the Institute of Higher Education) of Jiao Tong University in Shanghai, China. ARWU is determined on the basis of six objective indicators, namely: the number of graduates and staff awarded the Nobel or Fields Prize, the number of highly cited researchers, articles published in the journals Nature and Science, articles indexed in the Science Citation Index - Expanded and Social Sciences Citation Index, productivity of the university per capita. Significant influence of ARWU is due to scientifically sound, stable and transparent methods used during ranking [1]. As in the previous ranking, most of its criteria assess the scientific performance of universities.

When compiling the World University Rankings QS, six simple indicators are used, which sufficiently characterize the performance of universities, including: academic reputation, reputation among employers, the ratio of students and teachers, citations, the ratio of international faculties, the ratio of foreign students [24]. Thus, the rating provides a detailed overview of educational institutions, on the basis of which applicants have the opportunity to determine which universities are the best in certain educational programs, learning conditions, opportunities for further employment, social responsibility, inclusiveness, and more.

The Best Global Universities Rankings are for positioning US universities among the world's leading educational institutions.

The ranking results can be used not only by entrants, but also by universities to determine their own competitive position within their country or region, as well as to find partners for international cooperation [20]. In order to further strengthen international cooperation between universities in 2018, the evaluation methodology has undergone some changes: the highest scores were given to schools that published articles co-authored with researchers from different countries.

Web or Webometrics is the highest academic ranking of higher education institutions. Since 2004 and every six months, the Cybermetry Laboratory (Spanish National Research Council, CSIC) has been conducting an independent, objective, free open scientific event to provide reliable, multidimensional, up-to-date and useful information on the work of universities around the world based on their web presence. In this case, Webometrics uses link analysis to assess quality, as it is a more powerful tool than citation analysis or global surveys [2].

The results of the ranking of educational institutions are widely used today. They are used, first of all, by potential students when deciding on the choice of educational institution to obtain a certain educational level (bachelor, master, graduate student, doctoral student). Given the steady increase in demand for educational services due to the increasing need for additional education, training and retraining, it is possible to predict a further increase in the popularity of rankings as a guide for more informed choices. In addition, the ranking provides each university with certain guidelines for its own development, helps to establish competition between higher education institutions, which, in turn, contributes to improvement of the educational programs quality.

Employers' interest in the ranking results is justified, on the one hand, by the level and quality of education of potential employees, and on the other – the possibility of interaction with the educational organization in the field of applied research and development, characterized by its relative research and innovation potential [17]. Numerous development and support foundations use ranking results to determine winners in various competitions.

Thus, the popularity of ratings is constantly growing, while also increasing the number of comments on the indicators used in the ratings and methods of determining them. In 2004, the International Rating Expert Group (IREG) was established to develop a system of rating principles. The purpose of the IREG rating approval process, conducted by independent experts, is to verify and confirm that the rating is compiled professionally, with a transparent methodology, best practices and meets the information needs of various stakeholders: students, higher education institutions, employers, etc.

Among the advantages of ranking educational institutions, researchers note: simplification and clarification of the complex environment of higher education for potential students and stakeholders; providing universities with advertising and promoting their popularity; providing incentives to improve the quality of education and the effectiveness of research; improving the quality of data collection in higher education. The disadvantages of rating activities are the provision of inaccurate information on the quality of education due to the restriction of access to internal data of educational institutions; providing a distorted picture of changes over time (incompatibility of data for different periods due to the fact that the indicators and methods of their processing change); disregard for universal ratings of the features of different types of educational institutions [21, p. 208].

Today, domestic institutions of higher medical education in international rankings are absent or occupy low positions. Thus, Lviv National Medical University in the ranking of Web or Webometrics occupies 3755 place [26], which is the best result among domestic medical institutions. For six months of 2016, Bogomolets National Medical University underwent an independent external audit of the international rating system QS Stars University Rankings (London, UK), which resulted in three

of the five possible QS Stars stars, becoming the first and the only educational medical institution in Ukraine that received such a high rating [27]. In other international rankings, there are no domestic institutions of higher medical education.

According to experts, the reasons for the absence of Ukrainian medical universities in international rankings are unsatisfactory level and volume of scientific work, academic dishonesty, low level or complete lack of international cooperation, insufficient citation of scientific papers, insufficient volume of publications in international scientific journals, reduction of foreign students, low level of academic mobility, lack of international experience among teachers, lack of educational programs, the disciplines of which are fully taught in English.

National rankings of educational institutions can serve as a reference point for choosing a domestic medical institution of higher education for entrants. Among them, there are the rating of Ukrainian universities "Top-200 Ukraine", the rating Scopus, the rating "External Evaluation Ball for a contract" (Table 2) and the consolidated rating of higher education institutions of Ukraine.

Table 2: Characteristics of domestic rankings of higher education institutions

Rating name	Compilers, developers	Evaluation criteria	Evaluation indicators	Weighting coefficients, %
1	2	3	4	5
Ranking of Ukrainian universities "Top 200 Ukraine"	UNESCO Chair "Higher Technical Education, Applied Systems Analysis, and Informatics"	Quality of scientific and pedagogical potential (50%)	Number of full-time employees elected as academicians of the National Academy of Sciences (NAS) of Ukraine	27,5
			Number of full-time employees elected as corresponding members of the NAS of Ukraine	13,5
			Number of professors among full-time employees of the Free Economic Zone	2,5
			The number of associate professors among the staff of the Free Economic Zone	0,6
			Number of doctors of sciences among full-time employees of the Free Economic Zone	2,5
			Number of candidates of sciences among full-time employees of the Free Economic Zone	0,5
			The number of full-time employees awarded the State Prize in Science and Technology or the State Prize. T. Shevchenko	2,8
Quality of education (30%)	Number of students - winners and prize-winners of international Olympiads (competitions)	7,5		

			Number of students – winners and prize – winners of all – Ukrainian Olympiads (competitions)	1,5
			The ratio of the number of masters to the number of bachelors	7,0
			The scale of higher education institutions	14,0
		International recognition (20%)	Number of foreign students	1,0
			Membership of the educational institution in the European Association of Universities	7,0
			Membership of the educational institution in the Grand Charter of Universities	6,0
			Membership of the educational institution in the Eurasian Association of Universities	3,0
			Membership of the educational institution in the network of universities of the Black Sea region	3,0
Scopus rating	Publishing Ltd. Service LLC (Ukrainian Research and Academic Network)	Indicators of the Scopus database, which is a tool for tracking citations of a scientific article published by an educational institution or its employees in scientific journals. Higher education institutions are evaluated according to the Hirsch index – an indicator based on the number of scientific publications and the number of citations of these publications		-
Rating “External Evaluation Ball for the contract”	Information system «Vstup.OSVITA. UA»	Average score of external independent assessment certificates, calculated among all persons enrolled in self-study (contract) for the first year for a bachelor's degree on the basis of complete general secondary education		-

Source: compiled by the author using [20, 23, 31].

“Top-200 Ukraine” positions itself as a single rating accredited by the International Expert Group on Ranking (IREG), which is based on a universal system of criteria containing three comprehensive indices: the index of quality of scientific and pedagogical potential, the index of teaching quality and the index of international recognition. The performance of higher education institutions is determined using a general rating index, which is integrated and calculated on the basis of the above complex indices. In addition to the general rating table, for the best 200 Institutions of higher education are identified, ratings are determined by groups of universities: classical, technical, technological, pedagogical, medical, legal, economic, management and trade, agricultural, construction and transport, non-state institutions [28].

The results of the next ranking of higher education institutions are based on the indicators of the Scopus database, which is a tool for tracking citations of scientific articles published by an educational institution or its employees. In the ranking table, domestic Institutions of higher education are ranked according to the Hirsch index – a quantitative indicator based on the number of scientific publications and the number of citations. The best result on this indicator in 2018 among institutions of higher medical education was shown by Donetsk National Medical University – seventh place in the overall ranking [30].

When compiling the rating “External Evaluation Score for a contract,” the data of the introductory campaign were used, obtained by the information system from the Unified State

Database on Education. The ranking does not include higher education institutions, which include less than 20 people on a contract basis, as well as some structural units of educational institutions. The average score of external independent evaluation certificates is calculated among all persons enrolled in the first year at the expense of individuals and legal entities (contract). The third place in the ranking in 2018 is occupied by the Ukrainian Medical Dental Academy (the best result among medical educational institutions), while the National Medical University named after O. O. Bogomolets in the fifth place [30].

The consolidated rating of Institutions of higher education is an information resource “Osvita.ua” based on the ratings “TOP-200 Ukraine”, “Scopus”, and “External Evaluation Score on a contract”: each Institution of higher education is assigned a score equal to the sum of its places in each of the three ratings. If an educational institution was not represented in any of the ratings, it is assigned the place following the last in this rating (201, 163, 201, respectively). According to the results of 2018, the seventh (highest) place in the consolidated ranking among medical freelancers belongs to the National Medical University named after O. O. Bogomolets [25].

In our opinion, an interesting experience in rating domestic medical Institutions of higher education was the analysis of rating indicators of twelve higher medical education institutions and three postgraduate education institutions, which was conducted in accordance with the order of the Ministry of Health of Ukraine “On rating evaluation of higher education institutions” from 22.11.2013 No. 1000 [19] in order to properly summarize the results of evaluation of various aspects of their activities in 2014.

The results of the evaluation are presented in the Sectoral Handbook [22] in the form of generalized information on monitoring the activities of the above educational institutions on forty key indicators. All indicators are grouped into eight separate sections: educational and methodical work; research activities; personnel policy; international, state and sectoral recognition of work; educational activities; medical work; logistics, financial and economic activities. The method of analysis involved compiling rating matrices of institutions for each indicator, group of indicators and in general for the activities of the institution with the provision of assessments: “successful,” “sufficiently successful,” “partially successful,” and “needs improvement.” Unfortunately, the compilers of the handbook did not build a final rating during the overall assessment, and the developed proposals provided recommendations to heads of educational institutions and organizers of higher medical education on the need to improve certain indicators that received the lowest score.

## 2.2 Assessment of the Competitiveness of Higher Medical Education and its Institutions in the context of Economic Cooperation

An indicator of the competitiveness of the higher education sector of Ukraine is the position of higher medical education institutions in international and domestic rankings. In 2017, domestic ZVMOs are absent or occupy low positions in international rankings (Table 3).

Table 3: Ranking of institutions of higher medical education in Ukraine, in 2015–2017

Place	Name of higher education institution	Place in the overall ranking		Top 200 Ukraine		Webometrics		Scopus		Final score		Ball changes in 2017
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	
1	Donetsk National Medical University	13	34–35	30	85	15	41	7	7	52	133	155,8
2	National Medical University named	26	25	8	7	99	79	18	15	125	101	-19,2

	after O. O. Bogomolets												
3	Lviv National Medical University named after D. Halatsky	27	20–21	56	48	61	21	12	12	129	81	-37,2	
4	Bukovynian State Medical University	30–31	34–35	64	52	22	34	46	47	122	133	9,0	
5	Dnipropetrovsk Medical Academy	50–51	46	51	53	121	100	25	21	197	174	-11,7	
6	Odessa National Medical University	50–51	69	46	45	116	163	32	34	197	242	22,8	
7	Ternopil State Medical University named after I. Gorabchevskyy	54	54–55	101	87	30	37	86	78	217	202	-6,9	
8	Zaporizhia State Medical University	55–56	78–79	84	61	73	159	61	46	218	266	22,0	
9	Vinnytsia National Medical University named after MI Pirogov	63	56	29	26	138	94	79	83	246	203	-17,5	
10	Ukrainian Medical Dental Academy	65	85	53	50	114	148	82	85	249	283	13,7	

Source: compiled by the author according to the data of international and domestic rating agencies.

Thus, Lviv National Medical University rank is 3755<sup>th</sup> in the Web or Webometrics ranking. According to the international rating system QS Stars University Rankings, National Medical University named after O. O. Bogomolets received three stars out of five possible QS Stars. Thus, summarizing the above, we can conclude that the main evaluation criteria in compiling international and national rankings of higher education institutions are the level of educational work, research, personnel policy, and international orientation.

In order to create preconditions for the development of these areas of Ukrainian medical universities, we consider it appropriate to implement a unified system for determining the competitive position of each individual freelancer on the basis of self-assessment of a combination of competitiveness factors and evaluations of experts exhibited during monitoring visits. The results can be calculated using a qualimetric approach.

### 3 Results

For further use of the results of the evaluation of the competitive position of a particular free economic zone as training parameters in the national and international ranking, one can choose educational and training work, personnel, research and international activities. The qualimetric approach involves the establishment of a weighting factor for each parameter, which reflects its importance in achieving competitive advantages in the market of educational services. Given the orientation of educational institutions, primarily on consumers of services provided, the distribution of weights can be as follows: teaching and educational work – 0.35, staff – 0.25, research – 0.20, international activities – 0.20. The content of the evaluation parameters is specified by several factors, which, in turn, contain five criteria. A weighting factor is also set for each factor and criterion. The weights of parameters, factors within one parameter and criteria within one factor are one (Table 4).

Table 4: Qualimetric approach to assessing competitiveness institution of higher medical education

Parameters	Kv <sub>g,p</sub>	Factors	Kv <sub>g,f</sub>	Criteria	Kv <sub>g,k</sub>				
1	2	3	4	5	6				
Educational and upbringing work	0,35	Training and its results	0,25	The ratio of staff and students	0,25				
				Availability of English-language educational programs	0,20				
				Availability of student exchange programs	0,15				
				Results of licensing exams	0,30				
				Number of prize-winning students of student subject Olympiads	0,10				
				Total	1,00				
				Educational and methodical work	0,20			Publication of educational literature	0,25
								Publication of methodical literature	0,25
								Introduction of innovative teaching methods into the educational process	0,20
								Participation in medical and pharmaceutical exhibitions	0,15
Publication of scientific and methodical articles and abstracts	0,15								
Total	1,00								
Therapeutic work	0,25			Number of university clinics	0,25				
				Consultative and surgical activity of employees during the year	0,2				
				Participation in the development of clinical protocols	0,15				
				Teachers have a medical qualification category	0,15				
				Technologies for acquiring practical skills	0,25				
				Total	1,00				
				Educational Activities	0,10			Number of prize-winning students of art and creative competitions	0,20
								Number of students - winners of sports competitions	0,20
				Participation of students in the volunteer movement	0,15				
				Number of	0,25				

		events dedicated to significant events, national and cultural traditions, leading scientists, etc.	
		The number of missed classes for no good reason per 100 students	0,20
		Total	1,00
Logistics	0,20		
		Number of training places in educational and training centers	0,20
		Provision of dormitories for non-resident subjects per 100 non-resident persons	0,20
		Provision of computers connected to the Internet for 100 people	0,25
		Providing modern textbooks published in the last 5 years for 1 subject of study	0,15
		Number of seats in electronic reading rooms with free wireless internet access per 100 people	0,20
		Total	1,00
Staff	0,25		
		Qualification level	0,40
		Number of professors working at the main place of work per 100 faculty members	0,20
		Number of associate professors working at the main place of work, per 100 faculty members	0,20
		The share of candidates and doctors of sciences who have not reached retirement age	0,25
		The share of teachers without a degree who have been working for more than three years	0,20
		Number of teachers working as freelance specialists of the Ministry of Health of Ukraine and structural subdivisions on health care of city state administrations, per 100 positions	0,15
		Total	1,00

	Certification training	0,35	
			Thematic improvement, internship in the workplace
			0,10
			English language courses
			0,25
			Pre-certification cycles
			0,20
			Field training courses
			0,25
			Specialization courses
			0,20
			Total
			1,00
	Personnel policy	0,25	
			Availability of personnel reserve
			0,15
			Involvement of teachers in decision making
			0,25
			Existence of practice of holding open competitions for positions
			0,20
			Availability of effective contracts
			0,25
			Existence of life contracts
			0,15
			Total
			1,00
Scientific work	0,20		

Source: compiled by the author.

To determine the level of competitiveness of a particular educational institution, it is proposed to use a five-point rating scale:

- 0–1.9 - inadmissible level; 2.0–3.0 - critical (low) level; 3.1–3.9 - sufficient (average) level; 4.0–4.5 – high (above average) level; 4.6–5.0 – excellent (very high) level.

The score of each factor is defined as the sum of the products of the scores for each criterion and the corresponding weights:

$$F_i = \sum_{k=1}^N K_i \times K_{vag.k.i} \tag{1}$$

where  $F_i$  – weighted estimates of the  $i$ -th factor;  
 $K_i$  – score of the  $i$ -th criterion;  
 $K_{vag.k.i}$  – weighting factor of the  $i$ -th criterion;  
 $N$  – the number of criteria.

The evaluation of each parameter is defined as the sum of the products of estimates for each factor and the corresponding weighting factor:

$$P_i = \sum_{f=1}^N F_i \times K_{van.f.i} \tag{2}$$

where  $P_i$  – a weighted estimate of the  $i$ -th parameter;  
 $F_i$  – balanced assessment of the  $i$ -th factor;  
 $K_{van.f.i}$  – weighting factor of the  $i$ -th factor;  
 $N$  – number of factors.

The assessment of the level of competitiveness of an educational institution is defined as the sum of the products of assessments by parameters and the corresponding weighting factor:

$$PKSP = \sum_{i=1}^N P_i \times K_{vag.n.i} \tag{3}$$

where  $RKSP$  – the level of competitiveness of the educational institution;

$P_i$  – weighted estimate of the  $i$ -th parameter;  
 $K_{vag,ni}$  – weighting factor of the  $i$ -th parameter;  
 $N$  – number of parameters.

As reference indicators for comparison, it is possible to use indicators of the leading national medical Institutions of higher education, normative requirements of the Ministry of Health of Ukraine, expert estimations of the experts participating in monitoring measurements.

#### 4 Discussion

The information database for determining the competitiveness of the institution of higher medical education can serve as data of the electronic system of internal rating of the departments, structural units of the university and its teaching staff. Zaporizhzhya State Medical University (ZSMU) has many years of experience in conducting such a rating [31].

The rating system for evaluating the activities of structural units and teachers of ZSMU is aimed at summarizing the results of various aspects of activities and identifying ways to improve the work of structural units, increase creative activity of teachers, the formation of priority areas in educational, methodological and scientific areas. In addition, the rating of each teacher is an objective basis for the work of the certification commission during the extension of the personal contract and material incentives for employees. The relevant "Regulation" is developed in accordance with the requirements of the order of the Ministry of Health of Ukraine "On rating assessment of higher education institutions of the IV level of accreditation and postgraduate education institutions of the Ministry of Health of Ukraine" [19].

Thus, to ensure the integrated use of the proposed qualimetric approach to assessing the competitiveness of higher medical education it is necessary:

- To review the criteria for evaluating the results of the work of departments, structural units and teachers of educational institutions in order to bring them to a single system of indicators, an example of which may be a list of criteria listed in Table 3;
- To introduce regular implementation of intra-university ranking of departments, structural units, and teachers of higher medical education;
- To establish optimal time limits for collecting and processing information in order to create conditions for its further use in the national and international ranking of domestic institutions of higher medical education.

The practical value of bringing the methods of rating evaluation of the results of educational institutions to a single system that could be applied at the local, national and international levels will be as follows:

- Use of information obtained during the intra-university rating evaluation of the results of departments, structural units and teachers to improve the work of structural units, increase the creative activity of teachers, optimize internal personnel policy, develop plans for educational, methodological and scientific activities of the institution;
- Determination of the competitive position of free economic zones in the national market of educational services;
- Identification of problem areas of the educational institution in order to develop measures to improve some of its indicators, which received an unsatisfactory assessment;
- Providing detailed information to applicants, researchers, and teachers on the performance of higher education;
- Formation of a positive image of the institution at the international level (Figure 1).

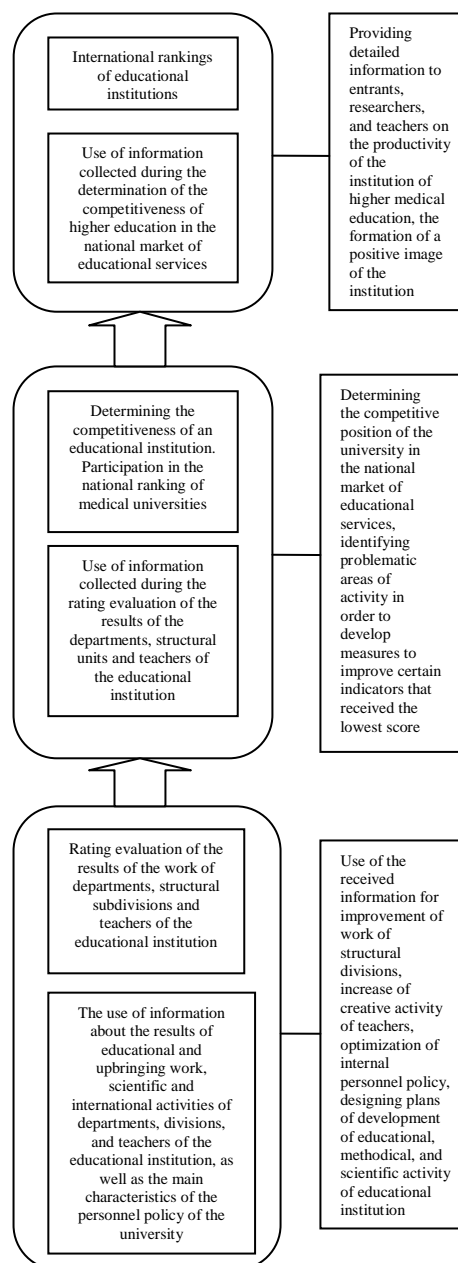


Figure 1 – Levels and practical value of using a comprehensive methodology for determining the competitiveness of higher medical education (compiled by the author)

#### 5 Conclusion

The results of the study showed that domestic institutions of higher medical education are not represented in the leading international rankings of educational institutions and occupy satisfactory positions in national rankings, which reflect their lack of competitiveness in the market of educational services. In order to increase the competitiveness of Ukrainian medical institutions of higher education, it is proposed to use a comprehensive methodology for assessing the competitive position of the educational institution.

The results of this assessment will create a database for further participation in national and international rankings and identify problem areas of the institution, develop measures to improve the work of structural units of higher education, increase creative activity of teachers; optimize internal personnel policy, development plans for training, methodological and scientific activity of the educational institution.

The direction of further research may be the development of a unified system of normative indicators of educational institutions and methods of measuring the results of educational, scientific, international, and personnel work of medical institutions of higher education.

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#### Primary Paper Section: A

#### Secondary Paper Section: AH