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System of comprehensive evaluation of academic staff activity

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Abstract. Universities evaluate the activities of academic staff annually to encourage excellence in performance and to develop training programmes to enhance their professional skills. The evaluation of academic staff activities is mainly based on the results of their scientific work, but it is important to take into account other areas of their responsibilities. Therefore, the purpose of the study was to develop a system for the comprehensive evaluation of academic staff, which would consider the outcomes of their pedagogical, methodological, scientific, and organisational work. The method employed involved the analysis of university regulatory documents that define academic staff evaluation systems. Graphs were utilised to model the structure of the relationships between the criteria of the proposed evaluation system. The evaluation system determines the indices of academic staff work efficiency both for individual types of activities and comprehensively. According to the system, the outcomes of all academics are compared with the best results achieved in the current year at the university or national level. The calculations of the comprehensive index of activity efficiency for each academic enable the formation of university, faculty, and departmental rankings of academic staff, as well as the categorisation of performance levels based on the proposed scale. It was recommended that the evaluation results be presented in academic portfolios on the university website to ensure transparency. This approach also enables stakeholders to track changes in academics' effectiveness over time. The evaluation system will enhance personnel management in universities, thereby contributing to the achievement of strategic goals for institutional development. The proposed academic staff evaluation system can be implemented at both the university and national levels. Its implementation will further foster a competitive environment among academics at the national, university, faculty, and departmental levels

Keywords: teachers and research staff evaluation; evaluation criteria; academic efficiency; teacher ranking; academic portfolio

INTRODUCTION

Staff evaluation is an important element of human resource management, centred on determining the alignment between staff performance indicators, their characteristics, and the requirements of the positions they hold. As employees possess varying levels of knowledge, skills, and abilities, they accordingly perform their job duties with

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differing levels of efficiency. To develop an effective system for motivating all employees (from high performers to those with lower levels of achievement), it is necessary to evaluate their performance. Consequently, the development of an objective and flexible system for the evaluation of academic staff in universities is essential. Such a system would enable the creation of a fairer and more effective approach to their motivation and foster a competitive environment among academics.

In the modern era, educational institutions play a critical role in producing a high-quality national education system capable of competing globally (Kadiyono *et al.*, 2020). Public higher education institutions face significant pressure to improve their performance and quality by increasing the number of publications, citations, and graduates, while also ensuring the efficient use of public resources (Ramírez-Gutiérrez *et al.*, 2020). M. Jedemark & M. Londos (2021) observed that various efforts have been made in higher education to meet the growing demand for more transparent governance and enhanced efficiency and quality. According to O. Anyanwu (2021), the effectiveness of a university's activities is primarily determined by the extent to which academics meet the requirements of their positions. Universities can only achieve their development goals with highly qualified academic staff. The degree of compliance of academic staff with position requirements can be assessed through performance evaluations, which are among the key functions of personnel management. Personnel management in universities involves leveraging the results of academic evaluations to identify top performers and to create opportunities for their professional development, as academics must engage in professional learning throughout their careers (Garner & Kaplan, 2021). Evaluations also enable university management to identify underperforming and poorly qualified academics.

The evaluation of academics' performance is a complex issue because it involves multiple criteria. As noted by M. Popović *et al.* (2020), evaluation outcomes are significantly influenced by the choice of criteria, their values, and the weights assigned to them. The efficiency evaluation of academic staff relies on both objective data and subjective survey results. According to the Law of Ukraine No. 1556VII (2014), the university system for ensuring the quality of higher education must include the annual evaluation of academic staff and the regular publication of evaluation results on the university website. Universities have the autonomy to select the criteria for academic evaluation and to assign scores to various types of activities (Yaroshenko, 2021). However, university administrations are often guided by their own perceptions of the importance of each criterion. Thus, the development of a comprehensive system for evaluating academic staff activities is a crucial issue for university management, as the successful implementation of university strategies depends on it.

According to the Law of Ukraine No. 1556-VII (2014), the working time of academics encompasses pedagogical, methodological, scientific, and organisational activities. At the same time, W. Wahyudi (2022) stated that academics have three main tasks: providing quality teaching, conducting research to contribute to progress, and offering community service as an application of teaching and research. Despite the diversity of responsibilities, the career progression of academics depends primarily on the outcomes of their scientific work. K. Paudel (2021) emphasised the importance of research quality and the number of articles published in high-ranking indexed journals in measuring academic staff performance. To achieve prominent positions in the highly competitive university environment, key components of academic staff responsibilities include active publication of research articles and maintaining high performance and quality in research activities.

D. Maisano *et al.* (2023) found that the policies of most higher education institutions prioritise research over teaching. Such university strategies, coupled with academic staff evaluation systems that predominantly focus on scientific achievements, can hinder creativity and innovation in teaching. It is evident that when teaching effectiveness carries limited weight in evaluation systems, academics are likely to dedicate more effort to areas deemed more significant in evaluations, rather than enhancing their pedagogical skills (Wan & Jin, 2021). Therefore, the criteria for evaluating the professional activities of academic staff should ensure the assessment of not only research but also pedagogical and community engagement, as well as ethical interactions with colleagues, students, and university administrators. Moreover, when developing academic staff evaluation criteria, it is essential to adhere to the requirements of the Resolution of the Cabinet of Ministers of Ukraine No. 1187 (2015).

A specific evaluation process for academic staff necessitates selecting an appropriate method tailored to the university's actual needs. According to X. Zhang *et al.* (2021), a variety of evaluation methods are employed to assess academic staff, which can be broadly categorised as qualitative, quantitative, or comprehensive approaches that combine both. The evaluation of academics based on these criteria should support the development of leadership potential, enhance the efficiency of their activities, and motivate them toward innovation and professional growth. This, in turn, will contribute to the formation of a high-quality academic staff. Additionally, it is advisable to review and approve the evaluation criteria and weighting coefficients for each type of academic activity annually, in line with the university's needs to improve its ranking.

Y. Mao *et al.* (2024) noted that the value of student evaluation of teaching lies not only in its immediacy but also in its rich information content, which encompasses teaching style, methodology, and attitude; the difficulty level and practicality of course content; areas of strength and weakness in teaching activities; and students' learning needs and expectations. The results of such evaluations can help academics better address students' needs and improve teaching effectiveness. A. Naumann *et al.* (2020) stated that student feedback is only one element in evaluating teaching

effectiveness. Another important criterion is student achievement, which can be assessed in various ways, such as through grades, standardised tests, and other measures. A. Fajčíková & M. Fejfarová (2019) found that students' perceptions of a course are most influenced by its usefulness and interest level, clarity and logical structure, and the lecturer's ability to explain and teach effectively.

S. Rafiq & S. Qaisar (2021) pointed out that academics should consider the results of their performance evaluations and strive to improve their teaching practices. University administration should support this by offering professional development courses targeting areas identified as weak in evaluations. Additionally, academics in high-ranking positions need to receive financial rewards based on evaluation results. As indicated by C. Wan & F. Jin (2021), the disadvantages of evaluation systems can include poor organisation, unqualified evaluation teams, lack of transparency and fairness in the process, and insufficient analysis of results and feedback. To encourage academic staff to support professional activity evaluations, it is essential to establish and approve clear implementation requirements and provide avenues for appeals. Evaluations should be transparent, reliable, comprehensive, and flexible, allowing for adjustments to weighting factors based on university priorities.

It is advisable to compare evaluation results separately for professors, associate professors, and assistants. Furthermore, evaluation systems should reflect the specific characteristics of the disciplines in which academics work. E. Zhang & W. Shi (2019) highlighted that academics in fields such as fine arts and design are less involved in scientific research and writing and are primarily engaged in creative activities. Therefore, artistic achievements should be incorporated into evaluation criteria. Evaluation results must be made publicly accessible, as mandated by Ukrainian legislation. V. Smirnova (2021) recommends that to ensure the transparency of university activities and foster healthy competition among academic staff, universities should publish academics' portfolios on their websites. These portfolios should include key indicators of professional activity, biographical details, selected publications, links to scientometric database profiles, citation metrics, and contact information.

Differences in evaluation methods across universities hinder comparisons of individual academics' indicators. Consequently, there is an urgent need to develop a comprehensive evaluation system for academic staff activities that can be applied across higher education institutions. The purpose of this study was to develop such a system for comprehensive evaluation in higher education institutions.

MATERIALS AND METHODS

The evaluation systems for academic staff at the following universities were analysed: Lutsk National Technical University, Lviv Polytechnic National University, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", National Aerospace University – "Kharkiv Aviation Institute", V.N. Karazin Kharkiv National University, Sumy State Pedagogical University named after A.S. Makarenko, and Odesa National University of Technology. P. Apodaca & H. Grad (2005) and S. Deng & X. Que (2018) proposed criteria for student evaluation of teaching activities, which were incorporated into the formation of a comprehensive evaluation system for academic staff activities. Y. Yan *et al.* (2010) proposed a teacher rating scale of A, B, C, D, and E, which was considered during the development of the rating scale for the comprehensive evaluation system.

A graph was used to capture relationships between criteria at different levels of the evaluation system. A graph is composed of a set of nodes connected by lines (Koutrouli *et al.*, 2020). The graph for the comprehensive evaluation system contains six levels: zero, first, second, third, fourth, and fifth. This graph reflects the multi-level hierarchical structure of the criteria for assessing the effectiveness of academics' activities. At the zero level, there is a comprehensive criterion for evaluating the performance of academic staff. At the first level, the graph includes comprehensive criteria for the effectiveness of academic staff categorised by the main types of activities. At subsequent levels, the graph includes subcriteria of these comprehensive criteria. In the comprehensive evaluation system, the effectiveness of academics' activities for each criterion is quantified using a relative index:

$$Q_i = m_i \frac{P_i}{P_{bi}}, \quad (1)$$

where Q_i is the relative index characterising the effectiveness of academic staff according to criterion i; m_i is the weighting coefficient of criterion i; P_i is the index representing the effectiveness of academics' activities according to criterion i in the current year; and P_{bi} is the base index for criterion i in the current year. The base index P_{bi} represents the best result achieved by academic staff in the current year for the given criterion. The base index is determined separately for professors, associate professors, and assistant professors. When calculating indices Q_i, the importance of each type of activity (criterion) is incorporated through the weighting coefficients m_i, the values of which are determined by the university administration based on its strategic objectives. The sum of weighting coefficients within each group and subgroup of criteria is equal to 1:

$$\sum_{i=1}^{n} m_i = 1, \ (0 < m_i < 1), \quad (2)$$

where n is the number of criteria in the criteria group.

RESULTS AND DISCUSSION

The system for the comprehensive evaluation of academics' activity at the university includes grouped criteria, the relationships among which are represented in the form of a graph, parts of which are shown in Figures 1-5. Taking into account all the criteria, the comprehensive index of the effectiveness of academics' activity Q (zero level of the graph – Fig. 1) is calculated using equation (3):

$$Q = Q_1 + Q_2 + Q_3 + Q_4, \quad (3)$$

where Q_1 is the comprehensive index that considers the evaluation of the pedagogical activity of academics based on the group of criteria in Table 1; Q_2 is the comprehensive index that considers the evaluation of the methodological activity of academics based on the group of criteria in Table 2; Q_3 is the comprehensive index that considers the evaluation of the scientific activity of academics based on the group of criteria in Table 3; Q_4 is the comprehensive index that considers the evaluation of the organisational activity of academics based on the group of criteria in Table 4. Comprehensive criteria for the pedagogical, methodological, scientific, and organisational activity of academic staff are placed on the first level of the graph (Fig. 1). These are characterised by the corresponding comprehensive indices Q_1, Q_2, Q_3, Q_4.

The comprehensive index of the effectiveness of pedagogical activity Q_1 considers the results of the evaluation of academics based on the criteria presented in Table 1 and is calculated using Equation (4):

$$Q_1 = m_1(Q_{1.1} + Q_{1.2} + Q_{1.3}),\ m_1 + m_2 + m_3 + m_4 = 1. \quad (4)$$

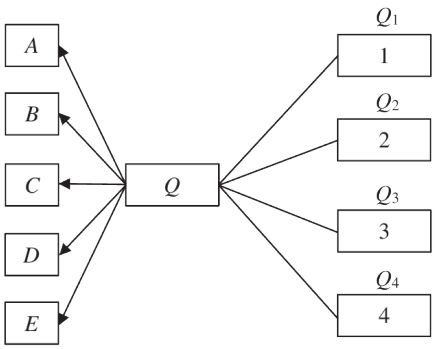

Figure 1. Part of the graph (zero and first levels) of the comprehensive evaluation system of academic staff
Source: developed by the author

Table 1. Criteria for evaluating the pedagogical activity of academics

Graph level 2	Graph level 3	Graph level 4
$P_{1.1}$ Teaching load (number of hours for teaching or supervision)	$P_{1.1.1}$ Lectures	
	$P_{1.1.2}$ Practical or laboratory classes	
	$P_{1.1.3}$ Final qualifying works of students	$P_{1.1.3.1}$ Bachelor's level
		$P_{1.1.3.2}$ Master's level
		$P_{1.1.3.3}$ PhD level
	$P_{1.1.4}$ Work in examination commissions	$P_{1.1.4.1}$ University conducting the evaluation
		$P_{1.1.4.2}$ Other universities
	$P_{1.1.5}$ Practice supervision	
	$P_{1.1.6}$ Student coursework or project	
$P_{1.2}$ Results of the student survey	$P_{1.2.1}$ Course planning	$P_{1.2.1.1}$ Informing students about the course programme
		$P_{1.2.1.2}$ Course programme compliance
		$P_{1.2.1.3}$ Informing students about the criteria, forms and timing of assessment of learning outcomes
	$P_{1.2.2}$ Preparing for class	$P_{1.2.2.1}$ Teacher readiness to teach
		$P_{1.2.2.2}$ Level of expertise
	$P_{1.2.3}$ Ability to communicate, teach and interact with students	$P_{1.2.3.1}$ Clarity of explanations
		$P_{1.2.3.2}$ Focus on key issues
		$P_{1.2.3.3}$ Respect for students' questions and suggestions
		$P_{1.2.3.4}$ Encouraging classroom activity
		$P_{1.2.3.5}$ Encouraging student research and critical thinking skills
	$P_{1.2.4}$ Didactic and methodical aspects	$P_{1.2.4.1}$ Theoretical material supplemented with examples, etc.
		$P_{1.2.4.2}$ Usefulness of recommended supplemental materials
		$P_{1.2.4.3}$ Use of modern information and communication technologies
	$P_{1.2.5}$ Assessing student learning	$P_{1.2.5.1}$ Applying the grading criteria outlined in the syllabus
		$P_{1.2.5.2}$ Objectivity of assessment

Table 1. Continued

Graph level 2	Graph level 3	Graph level 4
$P_{1.3}$ Student learning outcomes (grades/ score/level)	$P_{1.3.1}$ Passing the exam	
	$P_{1.3.2}$ Defending coursework or project	
	$P_{1.3.3}$ Defending final qualifying works	$P_{1.3.3.1}$ Bachelor's level
		$P_{1.3.3.2}$ Master's level
		$P_{1.3.3.3}$ PhD level
	$P_{1.3.4}$ Defending practice report	

Source: developed by the authors

For example, the calculation of the comprehensive index $Q_{1.1}$ or the group of sub-criteria 1.1 at all levels of the graph can be performed using equations (1) and (2), taking into account the connections among the sub-criteria shown in Fig. 2:

- the second level of the graph:

$Q_{1.1} = m_{1.1}(Q_{1.1.1} + Q_{1.1.2} + Q_{1.1.3} + Q_{1.1.4} + Q_{1.1.5} + Q_{1.1.6})$,
$m_{1.1} + m_{1.2} + m_{1.3} = 1$.

- the third level of the graph:

$$Q_{1.1.1} = m_{1.1.1}\frac{P_{1.1.1}}{P_{б1.1.1}}, Q_{1.1.2} = m_{1.1.2}\frac{P_{1.1.2}}{P_{б1.1.2}},$$
$$Q_{1.1.3} = m_{1.1.3}\left(m_{1.1.3.1}\frac{P_{1.1.3.1}}{P_{б1.1.3.1}} + m_{1.1.3.2}\frac{P_{1.1.3.2}}{P_{б1.1.3.2}} + \right.$$
$$\left. + m_{1.1.3.3}\frac{P_{1.1.3.3}}{P_{б1.1.3.3}}\right),$$
$$Q_{1.1.4} = m_{1.1.4}\left(m_{1.1.4.1}\frac{P_{1.1.4.1}}{P_{б1.1.4.1}} + m_{1.1.4.2}\frac{P_{1.1.4.2}}{P_{б1.1.4.2}}\right),$$
$$Q_{1.1.5} = m_{1.1.5}\frac{P_{1.1.5}}{P_{б1.1.5}}, Q_{1.1.6} = m_{1.1.6}\frac{P_{1.1.6}}{P_{б1.1.6}},$$
$$m_{1.1.1} + m_{1.1.2} + m_{1.1.3} + m_{1.1.4} + m_{1.1.5} + m_{1.1.6} = 1,$$
$$m_{1.1.3.1} + m_{1.1.3.2} + m_{1.1.3.3} = 1, m_{1.1.4.1} + m_{1.1.4.2} = 1.$$

For all groups of sub-criteria at all levels of the graph, calculations are performed similarly.

For the group of sub-criteria 1.1, the values of $P_{1.1.i}$, $P_{1.1.i.k}$ correspond to the number of hours dedicated to a specific academic activity (e.g., lectures, practical classes) in the annual teaching load. The values of $P_{b1.1.i}$, $P_{b1.1.i.k}$ represent the maximum number of hours allocated to that activity at the university for the current year. For instance, in the annual teaching load for an associate professor, the number of lecture hours in the current year is $P_{1.1.1} = 110$ hours, and the maximum number of lecture hours for associate professors in the current year is $P_{b1.1.1} = 160$ hours.

It is advisable to conduct a survey among students to evaluate academics' activity according to the group of sub-criteria 1.2 using a five-point scale, where 1 point represents the lowest rating and 5 points the highest. For the group of sub-criteria 1.2, the values of $P_{1.2.i}$, $P_{1.2.i.k}$ represent the average scores assigned by students to a particular teacher for each sub-criterion, while the values of $P_{b1.2.i}$ and $P_{b1.2.i.k}$ are equal to 5. For example, based on the results of the student survey, a teacher received an average score of $P_{1.2.3.1} = 4.3$ for the sub-criterion "$P_{1.2.3.1}$ Clarity of explanations", where the maximum possible score is $P_{b1.2.3.1} = 5$. For the group of sub-criteria 1.3, the values of $P_{1.3.i}$ and $P_{1.3.i.k}$ correspond to the average number of points obtained by

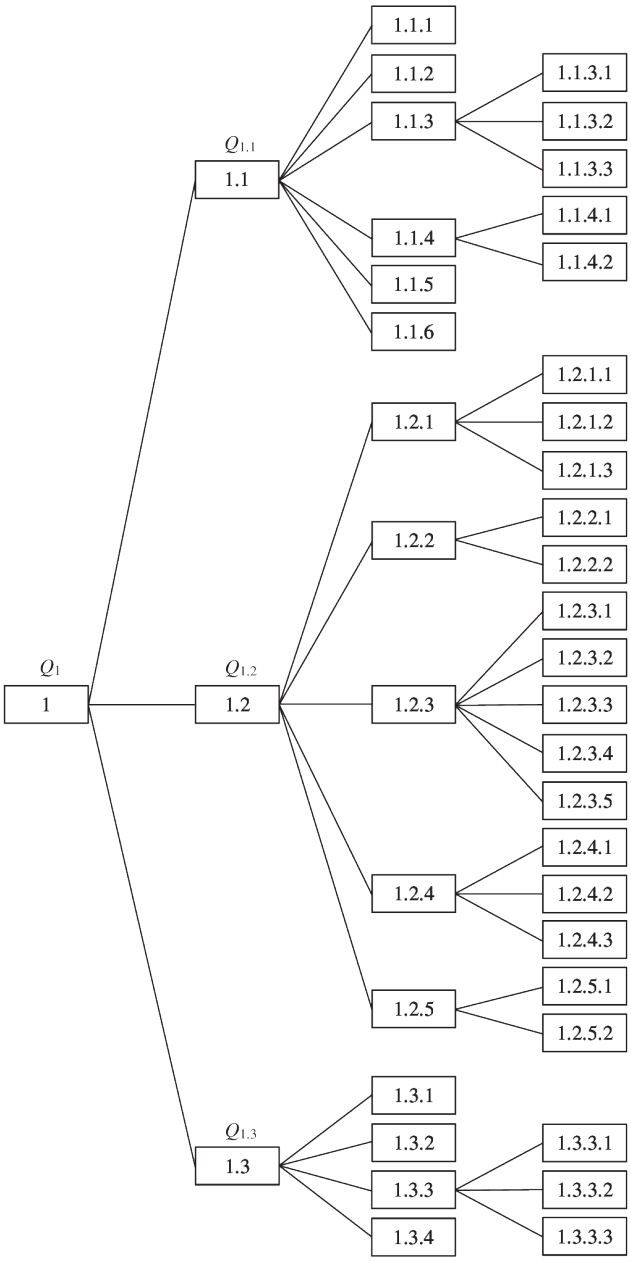

Figure 2. Part of the graph (first, second, third, and fourth levels) shows criteria for evaluating the pedagogical activity of academics

Source: developed by the authors

students in the teacher's course or during the defence of coursework/projects. If the university evaluates student learning outcomes on a 100-point scale, $P_{b1.3.i}$ and $P_{b1.3.i.k}$ are equal to 100 points. If a PhD student successfully defends a thesis under the supervision of an academic, the indices have the values $P_{1.3.3.3} = 1$, $P_{b1.3.3.3} = 1$. If the thesis is not defended, the index is $P_{1.3.3.3} = 0$. The comprehensive index of the effectiveness of methodological activity Q_2 takes into account the evaluation results based on the criteria presented in Table 2 and is calculated using equation (5):

$$Q_2 = m_2(Q_{2.1} + Q_{2.2} + Q_{2.3} + Q_{2.4} + Q_{2.5} + Q_{2.6} + Q_{2.7}). \quad (5)$$

Table 2. Criteria for evaluating the methodological activity of academics

Graph level 2	Graph level 3	Graph level 4
$P_{2.1}$ Preparing pedagogical and methodological publications	$P_{2.1.1}$ Textbooks, particularly electronic	$P_{2.1.1.1}$ In national language
		$P_{2.1.1.2}$ In a foreign language
	$P_{2.1.2}$ Training manuals, workshops, etc., particularly electronic	$P_{2.1.2.1}$ In national language
		$P_{2.1.2.2}$ In a foreign language
	$P_{2.1.3}$ Lecture notes, particularly electronic	$P_{2.1.3.1}$ In national language
		$P_{2.1.3.2}$ In a foreign language
	$P_{2.1.4}$ Recommendations for conducting classes, courses, etc.	$P_{2.1.4.1}$ In national language
		$P_{2.1.4.2}$ In a foreign language
$P_{2.2}$ Preparing regulatory filings	$P_{2.2.1}$ Educational programme development	$P_{2.2.1.1}$ Bachelor's level
		$P_{2.2.1.2}$ Master's level
		$P_{2.2.1.3}$ PhD level
	$P_{2.2.2}$ Educational program modernisation	$P_{2.2.2.1}$ Bachelor's level
		$P_{2.2.2.2}$ Master's level
		$P_{2.2.2.3}$ PhD level
	$P_{2.2.3}$ Education plan development	$P_{2.2.3.1}$ Bachelor's level
		$P_{2.2.3.2}$ Master's level
		$P_{2.2.3.3}$ PhD level
	$P_{2.2.4}$ Work plan development	$P_{2.2.4.1}$ Bachelor's level
		$P_{2.2.4.2}$ Master's level
		$P_{2.2.4.3}$ PhD level
	$P_{2.2.5}$ Curriculum development	
$P_{2.3}$ Developing student assessment tasks	$P_{2.3.1}$ Examination tasks	
	$P_{2.3.2}$ Modular control tasks	
	$P_{2.3.3}$ Final certification tasks	
	$P_{2.3.4}$ Entrance exam tasks	
$P_{2.4}$ Developing and implementing new teaching methods		
$P_{2.5}$ Participating in pedagogical and methodological activities	$P_{2.5.1}$ Department level	
	$P_{2.5.2}$ University level	
	$P_{2.5.3}$ National level	
	$P_{2.5.4}$ International level	
$P_{2.6}$ Conducting open lectures	$P_{2.6.1}$ At the university conducting the evaluation	
	$P_{2.6.2}$ At other universities	$P_{2.6.2.1}$ Ukraine
		$P_{2.6.2.2}$ Other countries
$P_{2.7}$ Reviewing pedagogical and methodological publications	$P_{2.7.1}$ National publications	
	$P_{2.7.2}$ International publications	

Source: developed by the author

For all groups of sub-criteria used to evaluate the methodological activity of academics (Fig. 3), the indices $Q_{2.i}$ are calculated using equations (1) and (2), taking into account the connections among the sub-criteria.

For the group of sub-criteria 2.1, the values of $P_{2.1.i.k}$ are equal to the number of pedagogical and methodological publications, including electronic publications, prepared and published in the current year. If the publications have multiple authors, it is advisable to calculate the number of publications using equation (6):

$$P_{2.1.i.k} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \ldots, \quad (6)$$

where n_1, n_2, n_3,… is the number of authors for each pedagogical and methodological publication (1, 2, 3, etc.).

The value of $P_{b2.1.i.k}$ is the maximum number of pedagogical and methodological publications prepared by a university teacher (professor, associate professor, or assistant) in the current year.

For the group of sub-criteria 2.2, the values of $P_{2.2.i}$ and $P_{2.2.i.k}$ correspond to the number of regulatory filings pre-

pared in the current year. The values of $P_{b2.2.i}$ and $P_{b2.2.i.k}$ represent the maximum number of regulatory filings prepared by a teacher (professor, associate professor, or assistant) in the current year.

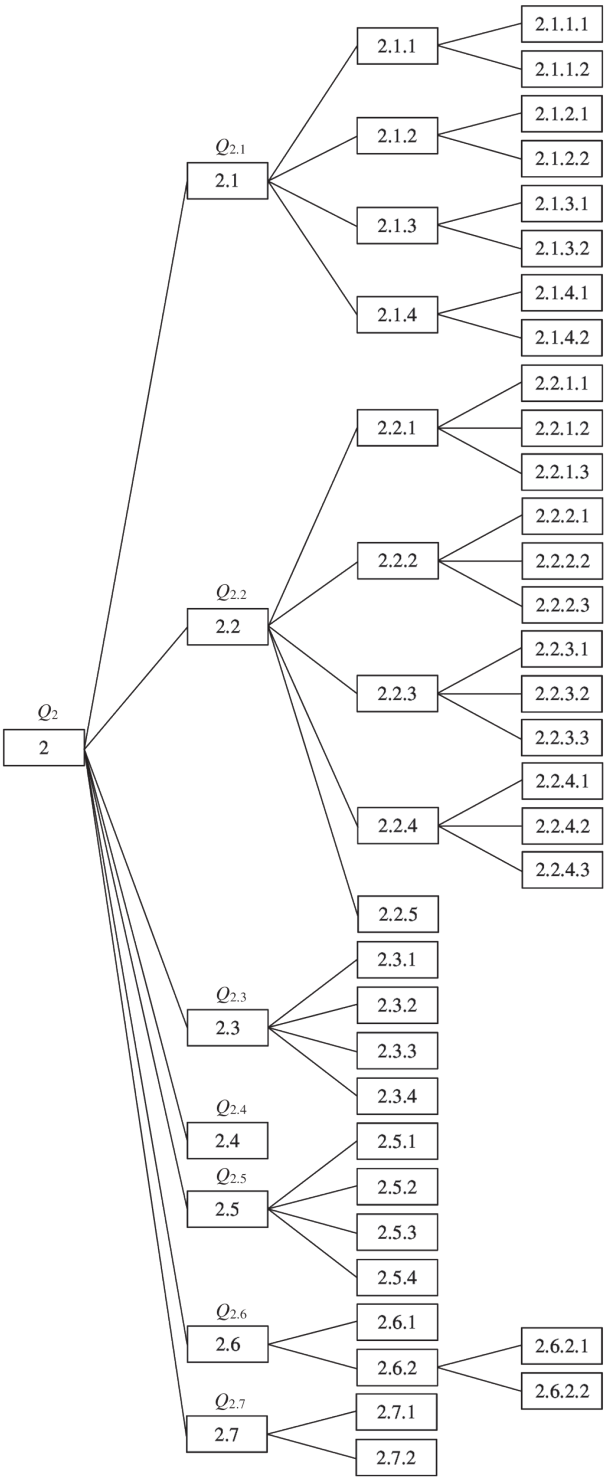

Figure 3. Part of the graph (first, second, third, and fourth levels) shows criteria for evaluating the methodological activity of academics

Source: developed by the authors

For the group of sub-criteria 2.3, the values of $P_{2.3.i}$ correspond to the number of sets of tasks prepared for student assessment in the current year. The values of $P_{b2.3.i}$ are the maximum number of sets of tasks prepared for student assessment by a teacher (professor, associate professor, or assistant) in the current year.

For the group of sub-criteria 2.4, the value of $P_{2.4}$ corresponds to the number of new forms, methods, and technologies of learning developed and implemented. The value of $P_{b2.4}$ represents the maximum number of such developments per teacher (professor, associate professor, or assistant) in the current year.

For the group of sub-criteria 2.5 the values of $P_{2.5.i}$ correspond to the number of pedagogical and methodological events attended by the teacher, while the values of $P_{b2.5.i}$ represent the maximum number of such events attended by a teacher (professor, associate professor, or assistant) in the current year.

For the group of sub-criteria 2.6, the values of $P_{2.6.i}$ and $P_{2.7.i.k}$ represent the number of open lectures delivered by the teacher in the current year. The values of $P_{b2.6.i}$ and $P_{b2.6.i.k}$ denote the maximum number of open lectures given by a teacher in the current year.

For the group of sub-criteria 2.7, the values of $P_{2.7.i}$ represent the number of reviews of pedagogical and methodological publications conducted by the teacher in the current year. The values of $P_{b2.7.i}$ denote the maximum number of such reviews conducted by a teacher (professor, associate professor, or assistant) in the current year.

The comprehensive index of the effectiveness of scientific activity Q_3 accounts for the evaluation results of the academics based on the criteria presented in Table 3 and is calculated using equation (7):

$$Q_3 = m_3(Q_{3.1} + Q_{3.2} + Q_{3.3} + Q_{3.4} + Q_{3.5} + Q_{3.6} + Q_{3.7} + Q_{3.8}). \quad (7)$$

Table 3. Criteria for evaluating the scientific activity of academics

Graph level 2	Graph level 3	Graph levels 4 and 5
$P_{3.1}$ Scientific publications, patents, and innovative products	$P_{3.1.1}$ Monographs	$P_{3.1.1.1}$ In the national language
		$P_{3.1.1.2}$ In a foreign language
	$P_{3.1.2}$ Collective scientific works	$P_{3.1.2.1}$ In the national language
		$P_{3.1.2.2}$ In a foreign language
	$P_{3.1.3}$ Articles published in peer-reviewed scientific journals	$P_{3.1.3.1}$ Articles published in national journals
		$P_{3.1.3.2}$ Articles published in WoS or Scopus-indexed journals $P_{3.1.3.2.1}$ Quartile Q1 $P_{3.1.3.2.2}$ Quartile Q3 $P_{3.1.3.2.3}$ Quartile Q4 $P_{3.1.3.2.4}$ Quartile Q5
		$P_{3.1.3.3}$ Articles published in other journals
	$P_{3.1.4}$ National and/or international conference materials	$P_{3.1.4.1}$ Not indexed by WoS or Scopus
		$P_{3.1.4.2}$ Indexed by WoS or Scopus
	$P_{3.1.5}$ Conference report abstracts	$P_{3.1.5.1}$ National conference
		$P_{3.1.5.2}$ International conference
	$P_{3.1.6}$ Patents and certificates of copyright registration	$P_{3.1.6.1}$ Patent for invention $P_{3.1.6.1.1}$ National patent $P_{3.1.6.1.2}$ International patent
		$P_{3.1.6.2}$ Utility model patent
		$P_{3.1.6.3}$ Industrial design certificate
		$P_{3.1.6.4}$ Copyright registration
	$P_{3.1.7}$ Registration of new types of equipment, technologies, plant varieties, materials, etc.	
$P_{3.2}$ Scientific work with students and its results	$P_{3.2.1}$ Supervising awarded scientific work of students	$P_{3.2.1.1}$ Scientific work awarded at the national level
		$P_{3.2.1.2}$ Scientific work awarded at the international level
	$P_{3.2.2}$ Promoting science among students (scientific and cognitive activities)	
	$P_{3.2.3}$ Articles in peer-reviewed scientific journals co-authored with students	$P_{3.2.3.1}$ Articles published in national journals
		$P_{3.2.3.2}$ Articles published in WoS or Scopus-indexed journals
		$P_{3.2.3.3}$ Articles published in other journals
	$P_{3.2.4}$ National and/or international conference materials co-authored with students	$P_{3.2.4.1}$ Not indexed by WoS or Scopus
		$P_{3.2.4.2}$ Indexed by WoS or Scopus
	$P_{3.2.5}$ Conference report abstracts co-authored with students	$P_{3.2.5.1}$ National conference
		$P_{3.2.5.2}$ International conference

Table 3. Continued

Graph level 2	Graph level 3	Graph levels 4 and 5
$P_{3.2}$ Scientific work with students and its results	$P_{3.2.6}$ Patents and certificates of copyright registration co-authored with students	$P_{3.2.6.1}$ Patent for invention $P_{3.1.6.1.1}$ National patent $P_{3.1.6.1.2}$ International patent
		$P_{3.2.6.2}$ Utility model patent
		$P_{3.2.6.3}$ Industrial design certificate
		$P_{3.2.6.4}$ Copyright registration
	$P_{3.2.7}$ Registration of new types of equipment, technologies, plant varieties, materials, etc. co-authored with a student	
$P_{3.3}$ Successful defence of theses (dissertations) supervised by the teacher	$P_{3.3.1}$ PhD	
	$P_{3.3.2}$ Doctor of Science	
$P_{3.4}$ h-index of the teacher in databases	$P_{3.4.1}$ Scopus	
	$P_{3.4.2}$ WoS	
$P_{3.5}$ Successful defence of theses (dissertations)by the teacher	$P_{3.5.1}$ PhD	
	$P_{3.5.2}$ Doctor of Science	
$P_{3.6}$ Participation in specialised scientific councils and reviewing process	$P_{3.6.1}$ Participation in specialised academic councils	$P_{3.6.1.1}$ Head of the specialised academic council
		$P_{3.6.1.2}$ Member of the specialised academic council
		$P_{3.6.1.3}$ Official opponent
		$P_{3.6.1.4}$ Reviewer
	$P_{3.6.2}$ Participation in reviewing processes	$P_{3.6.2.1}$ Monograph
		$P_{3.6.2.2}$ Articles $P_{3.6.2.2.1}$ Articles published in national journals $P_{3.6.2.2.2}$ Articles published in WoS or Scopus-indexed journals
		$P_{3.6.2.3}$ Scientific projects, works, etc.
$P_{3.7}$ Participation in scientific projects, research works, grants, programmes, internships, etc.	$P_{3.7.1}$ Head of scientific projects, research works, grants, programmes, etc.	$P_{3.7.1.1}$ International level
		$P_{3.7.1.2}$ National level
		$P_{3.7.1.3}$ Regional level
		$P_{3.7.1.4}$ University level
	$P_{3.7.2}$ Participant in scientific projects, research works, grants, programmes, etc.	$P_{3.7.2.1}$ International level
		$P_{3.7.2.2}$ National level
		$P_{3.7.2.3}$ Regional level
		$P_{3.7.2.4}$ University level
$P_{3.8}$ Serving on editorial boards of scientific journals	$P_{3.8.1}$ Editor-in-chief of peer-reviewed scientific journal	$P_{3.8.1.1}$ National journal
		$P_{3.8.1.2}$ Journal indexed by WoS or Scopus
	$P_{3.8.2}$ Deputy chief editor or secretary of a peer-reviewed scientific journal	$P_{3.8.2.1}$ National journal
		$P_{3.8.2.2}$ Journal indexed by WoS or Scopus
	$P_{3.8.3}$ Member of the editorial board of peer-reviewed scientific journals	$P_{3.8.3.1}$ National journal
		$P_{3.8.3.2}$ Journal indexed by WoS or Scopus

Source: developed by the authors

For all groups of sub-criteria for evaluating the scientific activity of academics (Fig. 4), the indices $Q_{3.i}$ are calculated using equations (1) and (2), which consider the connection between the sub-criteria.

For the groups of sub-criteria of criterion 3, the values of $P_{3.i}$, $P_{3.i.k}$, $P_{3.i.k.j}$, and $P_{3.i.k.j.m}$ are equal to the number of achievements by the academic (the number of monographs, articles, theses, patents, etc.; the number of peer reviews, dissertation defences; or the number of specialised academic councils, scientific projects, and programmes, or editorial boards of scientific journals in which the academic participates) in the current year. Meanwhile, the values of $P_{b3.i}$, $P_{b3.i.k}$, $P_{b3.i.k.j}$, and $P_{b3.i.k.j.m}$ represent the maximum number of such achievements by an academic (professor, associate professor, assistant) in the current year. For the group of sub-criteria 3.4, the values

of $P_{3.4.k}$ are equal to the h-index of the academic in the Web of Science (WoS) or Scopus databases, and the values of $P_{63.4.k}$ are equal to the maximum hindex of a teacher (professor, associate professor, or assistant) at the university during the current year. The comprehensive index of the effectiveness of organisational activity Q_4 considers the evaluation results of the academics based on the criteria presented in Table 4 and is calculated using equation (8):

$$Q_4 = m_4(Q_{4.1} + Q_{4.2} + Q_{4.3} + Q_{4.4} + Q_{4.5} + Q_{4.6} + Q_{4.7} + Q_{4.8} + Q_{4.9}). \quad (8)$$

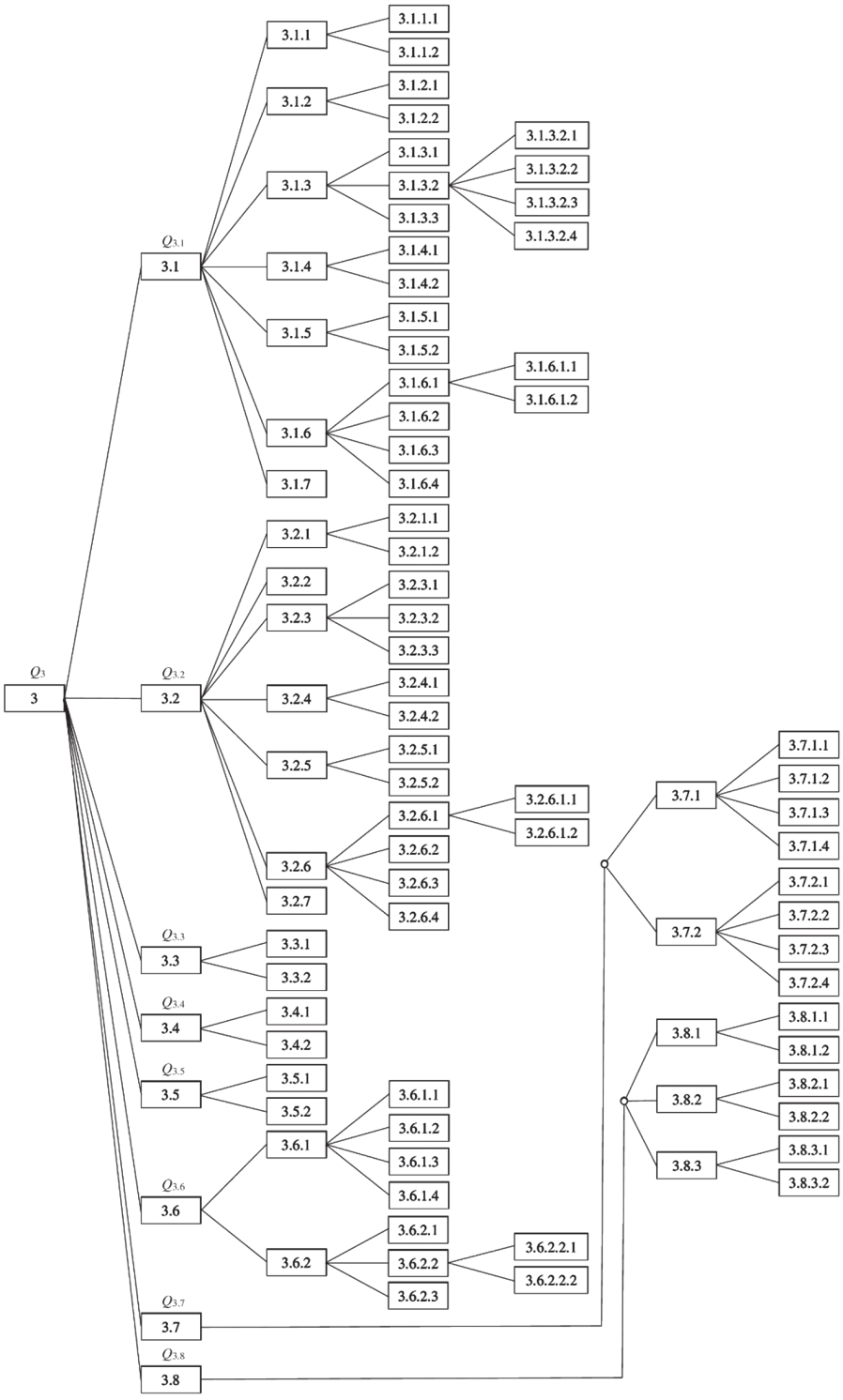

Figure 4. Part of the graph (first, second, third, fourth, and fifth levels) shows criteria for evaluating the scientific activity of academics

Source: developed by the authors

Table 4. Analysis of the results of respondents' psychological well-being by clusters (scales) before and after the experiment

Graph level 2	Graph level 3	Graph level 4
$P_{4.1}$ Organising scientific events (serving on organising committees for conferences, scientific seminars, etc.)	$P_{4.1.1}$ International level	
	$P_{4.1.2}$ National level	
	$P_{4.1.3}$ Regional level	
	$P_{4.1.4}$ University level	
$P_{4.2}$ Organising artistic and/or sporting events.	$P_{4.2.1}$ International level	
	$P_{4.2.2}$ National level	
	$P_{4.2.3}$ Regional level	
	$P_{4.2.4}$ University level	
$P_{4.3}$ Organising educational excursions, inviting lecturers and specialists in the field to teach		
$P_{4.4}$ Career orientation activities, coverage of university activities	$P_{4.4.1}$ University event participation	
	$P_{4.4.2}$ Participating in TV or radio shows	
	$P_{4.4.3}$ Print media publications	
	$P_{4.4.4}$ Social networking content creation	
$P_{4.5}$ Organisation of students' scientific work	$P_{4.5.1}$ Organisation and supervision of the student research group	
	$P_{4.5.2}$ Organisation of scientific competitions or olympiads	$P_{4.5.2.1}$ International level
		$P_{4.5.2.2}$ National level
		$P_{4.5.2.3}$ Regional level
		$P_{4.5.2.4}$ University level
	$P_{4.5.3}$ Organisation of scientific conferences	$P_{4.5.3.1}$ International level
		$P_{4.5.3.2}$ National level
		$P_{4.5.3.3}$ Regional level
		$P_{4.5.3.4}$ University level
$P_{4.6}$ Performance of duties as the academic group curator		
$P_{4.7}$ Performance of departmental duties (deputy head of department, departmental secretary, responsible for methodological or scientific work, etc.)		
$P_{4.8}$ Performance of roles in councils, commissions, or groups (scientific, technical, methodological, expert, etc.)	$P_{4.8.1}$ International level	
	$P_{4.8.2}$ National level	
	$P_{4.8.3}$ Regional level	
	$P_{4.8.4}$ University level	
$P_{4.9}$ Roles related to educational programme support	$P_{4.9.1}$ Guarantor	
	$P_{4.9.2}$ Support group member	

Source: developed by the authors

For all groups of sub-criteria for evaluating the organisational activity of academics (Fig. 5), the indices $Q_{4.i}$ are calculated using equations (1) and (2), which account for the connection between the subcriteria.

For the groups of sub-criteria 4.1-4.5 the values of $P_{4.i}$, $P_{4.i.k}$, and $P_{4.i.k.j}$ are equal to the number of events in which the teacher participated or organised in the current year, while the values of $P_{b4.i}$, $P_{b4.i.k}$, and $P_{b4.i.k.j}$ are equal to the maximum number of events in which a teacher (professor, associate professor, assistant) participated or organised in the current year. For the groups of sub-criteria 4.6-4.9 the values of $P_{4.i}$ and $P_{4.i.k}$ are equal to the number of tasks assigned to a teacher in the current year, while the values of $P_{b3.4.k}$ are equal to the maximum number of tasks assigned to a teacher in the current year. Using the calculated value of the comprehensive index of the effectiveness of academics' activity Q, the university, faculty (institute), and department ratings are formed for each category of academic staff (professor, associate professor, assistant). The level of academics' performance is also determined for each academic according to the scale presented in Table 5.

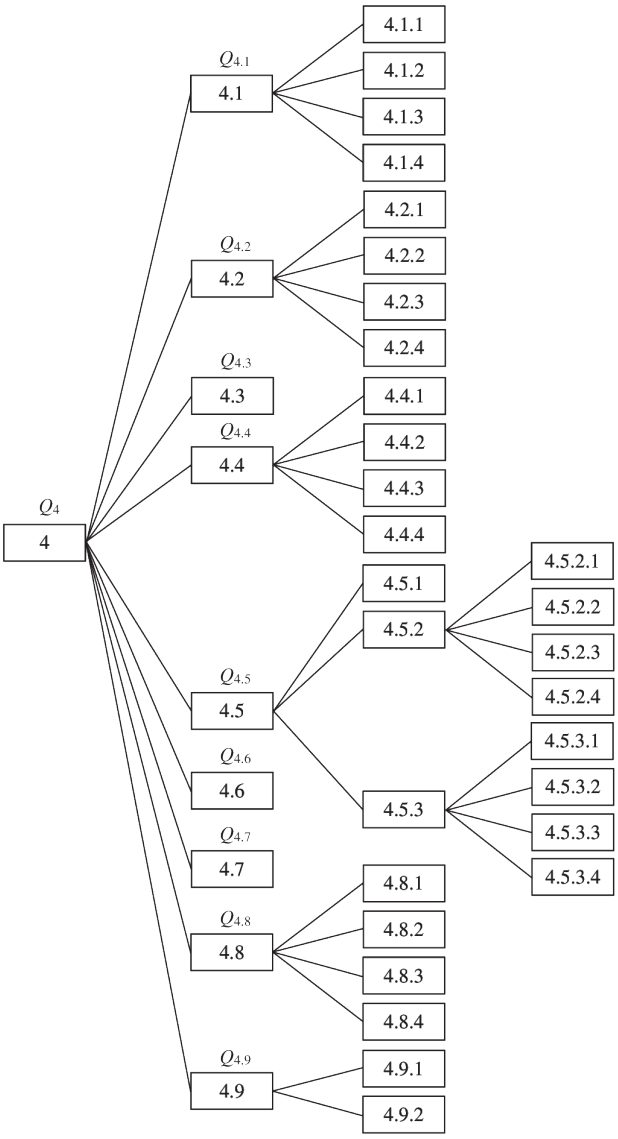

Figure 5. Part of the graph (first, second, third, and fourth levels) shows criteria for evaluating the organisational activity of academics

Source: developed by the authors

Table 5. Academic staff rating scale by comprehensive index Q

Level designation	Academic staff performance level	Comprehensive index Q
A	Very high	0.90-1.00
B	High	0.80-0.89
C	Sufficient	0.70-0.79
D	Medium	0.60-0.69
E	Low	< 0.59

Source: developed by the authors

According to the Law of Ukraine No. 1556-VII (2014), the rating of academics must be publicly available on the official website of the university. Moreover, it is advisable to form separate ratings for professors, associate professors, and assistants. Additionally, it is appropriate to form university, faculty (institute), and department ratings of academics, taking into account their positions. It is recommended to place the results of the evaluation of the effectiveness of academics' activities in the portfolios of academics on the university

website (an example of a portfolio is shown in Fig. 6). The portfolio can contain information about the comprehensive index Q and its components Q_1, Q_2, Q_3, and Q_4 for the last five years, as well as the performance level and position of the academic in the university, faculty (institute), and department ratings. The higher the value of the comprehensive index Q, the higher the position of the academic in the rating. Evaluation makes it possible to monitor the effectiveness of academics' pedagogical, methodological, scientific, and organisational activity, and to compare the teacher's results with the results of other academics in similar positions.

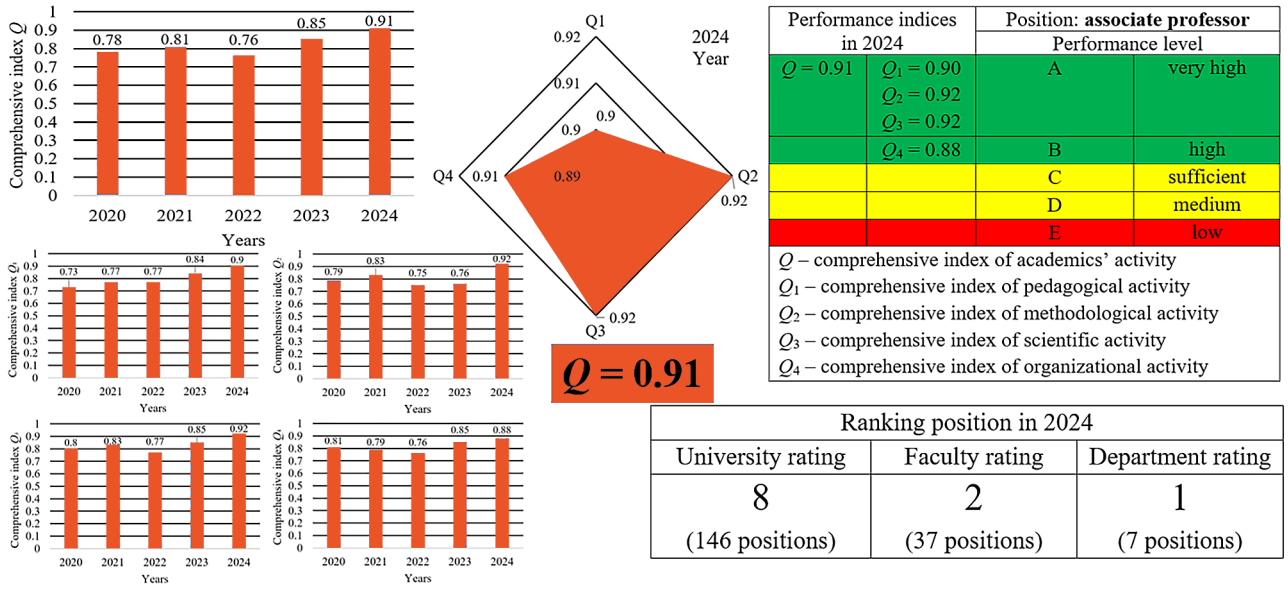

Figure 6. Academic portfolio

Source: developed by the authors

A similar system for evaluating the performance of academics can be applied at the national level. In this case, it would be necessary to take the performance results of the academic staff across all universities in the country as the basic indices. The proposed system of comprehensive evaluation of academic staff activity includes a set of criteria by which academics are evaluated in most universities across Ukraine. In particular, the system includes the criteria defined by N. Morze & O. Buinytska (2017): results of student evaluations of teaching activities; the number of scientific publications in national and international journals indexed by WoS or Scopus; participation in conferences, seminars, etc.; receipt of individual grants; defence of dissertations; preparation of students for participation in olympiads and scientific competitions; creation of training courses; preparation of regulatory filings; and participation in internship programmes. The system also takes into account indices of educational work, as proposed by V. Andrushchenko *et al.* (2017). O. Yaroshenko (2021) notes that depending on the development strategy of the university, its mission, and tasks, it may be possible to award additional points for priority types of activities or for special personal achievements that significantly affect the university's image.

M. Riaz (2000) and S. Young *et al.* (2009) identified the most common criteria used by universities to evaluate the performance of academics based on student feedback, among which are criteria included in the proposed comprehensive evaluation system. These criteria include preparation for classes, clarity of explanations, encouraging classroom activity, treating students' questions and suggestions with respect, usefulness of recommended supplemental materials, information about the course programme, and information about the criteria, terms, and forms of evaluation of learning outcomes. N. Kornell & H. Hausman (2016) point out that the results of student evaluations of teachers are important because they affect teachers' career progression, salary levels, and tenure.

According to the recommendations of M. Shah & C. Sid Nair (2012), it is advisable to evaluate the performance of teachers using student feedback at the end of each academic period (semester). S. Deng & X. Que (2018) argue that university administration can use the results of students' evaluations of teachers' performance to understand the general level of teaching, which, in turn, can help to propose effective measures for the management of the educational process. The question of how competent students are to evaluate the quality of teaching and course content remains controversial. M. Husain & S. Khan (2016) believe that students are not competent enough to evaluate a course holistically (e.g., its purpose, content, methods, and assessment criteria) but can provide feedback on the quality of classes or teaching. S. Young *et al.* (2009) found that student gender and teacher gender play an important role in how students evaluate teachers. Specifically, students rated teachers' pedagogical skills and course content higher for teachers of one gender than for the other. However, no

gender bias was found when students rated teachers' personal characteristics. Additionally, students who attend classes regularly tend to rate the course more highly.

According to S. Yu (2016), an important element of the academics' evaluation system is the consideration of the results of student learning, in particular, students' grades upon completing the course. In the proposed system, sub-criterion 1.3 reflects the results of student learning. For the objective assessment of academic staff, it is important to determine the weighting coefficients of the criteria. The most important criteria for achieving the strategic goal of the university and increasing its ranking should have higher values of weighting coefficients. T.-V. Duong *et al.* (2015) justified the weighting coefficients of groups of criteria through which students evaluate teachers: course content – 0.18; teaching method – 0.17; availability of teaching and methodological materials – 0.13; teacher's responsibility – 0.19; teacher's behaviour – 0.28. As noted by S. Moroz *et al.* (2017), the selection of the values of the weighting coefficients falls under the authority of the university administration.

In the proposed evaluation system, students evaluate the performance of teachers on a five-point scale. M. Aslam (2013) also suggested using a five-point Likert response scale for the quantitative assessment of teachers, where: 1 – strongly disagree, 2 – disagree, 3 – undecided, 4 – agree, and 5 – strongly agree. Y. Yan *et al.* (2010) suggest using another five-level scale for the evaluation of teachers' activities: "excellent", "good", "medium", "general", and "unqualified". Instead, P. Apodaca & H. Grad (2005) recommend using a seven-point scale: 1 – totally disagree; 2 – fairly strongly disagree; 3 – disagree; 4 – neither agree nor disagree; 5 – agree; 6 – fairly strongly agree; 7 – totally agree.

H. Gallagher (2004) recommends that at the end of each evaluation cycle, those responsible for its implementation meet with academic staff to discuss the results. This approach facilitates the identification of shortcomings in the evaluation system, enables the gathering of recommendations from academic staff, and provides opportunities to suggest ways to improve teacher effectiveness. O. Smagina *et al.* (2018) recommend the use of automated systems for the evaluation of academic staff. It should be noted that the proposed comprehensive evaluation system supports this functionality. I. Gryshchenko (2017) believes that the evaluation of academic staff can help determine and compare quantitative and qualitative indices of their professional activity, as well as create motivational mechanisms to improve these indices. Moreover, the position in the ranking significantly contributes to the formation of the teacher's image. According to I. Syngaivska (2015), it is necessary to remember that to succeed in the profession, personal responsibility, motivation for professional success, job satisfaction, and favourable conditions for self-development are also important.

The proposed comprehensive evaluation system is based on the best practices of academic staff evaluation implemented in universities across different countries. The system enables the evaluation of academics' achievements in pedagogical, methodological, scientific, and organisational work. The evaluation system is flexible, as it is possible to adapt the evaluation criteria depending on the field in which the academics work (art, technology, economy, etc.). Based on the evaluation results, the university administration will have the ability to motivate academic staff and make personnel decisions in an objective and transparent manner.

CONCLUSIONS

The proposed system for evaluating the activities of academic staff takes into account the results of pedagogical, methodological, scientific, and organisational activities based on the defined criteria for the current year. All activity results are compared with the highest achievements of academic staff within the university while considering the position of the academics. Based on the results of the academic performance evaluation, it is proposed to compile ratings for academics at the university, faculty (institute), and department levels and to determine their performance level on a scale of A (very high), B (high), C (sufficient), D (medium), and E (low).

The implementation of such a system can help identify the "weak" and "strong" aspects of the academic staff's activities and contribute to the creation of a competitive environment within the academic staff of the university. This approach will also motivate academics to improve their performance. The evaluation system will enable the university administration to create mechanisms for improving the effectiveness of various areas of academics' activities, aligned with the university's development strategy. Furthermore, it will allow for the transparent recognition of the best academics for their achievements in the current year using objective and clear criteria. It should be noted that the list of criteria for the evaluation of academics' activities is not exhaustive and can be adjusted depending on the areas in which academics are engaged. Therefore, the proposed system is flexible.

It is important to publish the results of academics' evaluations on university websites, particularly through the creation of academic portfolios. This measure will enhance academics' confidence in the evaluation process and the fairness of recognising achievements based on results. A similar evaluation system could be implemented at the national level, allowing for the evaluation of all academics using uniform criteria and enabling the creation of a national ranking of academics. Such a ranking would support an objective assessment of universities' activities and potential. Future research should focus on substantiating the procedures for implementing a comprehensive system for the evaluation and motivation of academic staff in universities.

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CONFLICT OF INTEREST

None.

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Система комплексного оцінювання діяльності науково-педагогічних працівників

Анотація. Університети щорічно проводять оцінювання діяльності науково-педагогічних працівників для їх заохочення за високі досягнення та розроблення програм підвищення їхньої професійної кваліфікації. Переважно, оцінювання діяльності науково-педагогічних працівників проходить за результатами наукової роботи, однак важливо ураховувати й інші напрями їхньої діяльності. Тому, метою дослідження було розробити систему комплексного оцінювання науково-педагогічних працівників, яка б ураховувала результати їхньої навчальної, методичної, наукової та організаційної роботи. Для вивчення нормативних документів, які визначають систему оцінювання науково-педагогічних працівників в університетах, використано метод аналізу. Для моделювання структури зв'язків між критеріями розробленої системи оцінювання науково-педагогічних працівників використано графи. Запропонована система оцінювання передбачає визначення показників результативності роботи викладачів як за окремими видами діяльності, так і комплексно. Відповідно до системи, усі результати діяльності науково-педагогічних працівників порівнюють з найкращими показниками, досягнутими в університеті або на загальнодержавному рівні у поточному році. Результати обчислення комплексного показника ефективності роботи кожного науково-педагогічного працівника дозволяють сформувати університетський, факультетський та кафедральний рейтинги науково-педагогічних працівників, а також визначити рівень досягнень викладачів за запропонованою шкалою. Результати оцінювання доцільно висвітлювати у портфоліо викладачів на сайті університету, що забезпечить прозорість оцінювання. Це також дозволить простежити динаміку зміни рівня ефективності роботи науково-педагогічних працівників упродовж певного періоду. Система оцінювання дозволить зробити більш ефективним менеджмент персоналу в університетах, що сприятиме досягненню стратегічних цілей розвитку університету. Запропонована система оцінювання діяльності науково-педагогічних працівників може бути упроваджена в університетах та на загальнодержавному рівні, що сприятиме створенню конкурентного середовища між науково-педагогічними працівниками на загальнодержавному, університетському, факультетському та кафедральному рівнях

Ключові слова: оцінювання викладачів і наукових співробітників; критерії оцінювання; академічна ефективність; рейтинг викладачів; академічне портфоліо