“Self-regulation system of continual improvement of quality and efficiency in higher education: A case of Ukraine”

AUTHORS	Oleksandr Velychko Svitlana Khalatur Nataliia Bondarchuk Mariia Bahorka

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Oleksandr Velychko (Ukraine), **Svitlana Khalatur** (Ukraine), **Nataliia Bondarchuk** (Ukraine), **Mariia Bahorka** (Ukraine)

SELF-REGULATION SYSTEM OF CONTINUAL IMPROVEMENT OF QUALITY AND EFFICIENCY IN HIGHER EDUCATION: A CASE OF UKRAINE

Abstract

Nowadays, the procedures for stimulating the improvement of the quality of higher education in Ukraine are mainly based on periodic expert evaluations. Besides, existing metrics of university efficiency are usually imperfect due to the frequent negative effects of Campbell's Law and Goodhart's Law. In addition, the war significantly limited resources for external quality assurance of educational programs. Given this, the aim of this paper was to develop a methodology for an additional self-regulation system of continual improvement of the quality and efficiency of educational activities of Ukrainian universities. The study is based on the advantages of the quantitative approach, measurement methods, and algorithmization in the management system of higher education. As a result, key indicators for the formation of national rankings have been developed by different segments. Moreover, the study elaborated algorithms and mechanisms to constantly encourage higher education institutions to improve quality and efficiency. The paper proposes preventive procedures to reduce the negative effects of unfair achievement of key performance indicators. The result of applying the methodology is additionally acquired or partially lost by the university the volume of license rights for the training of specialists in the current year. This will help curb the process of mass education with a low level of quality. In addition, the proposed system will balance the weaknesses of the accreditation expertise procedure, as well as actively stimulate the independent striving of each educational program for sustainable development and continual progress.

Keywords accreditation, Campbell's law, expertise, Goodhart's law, Kairyo, Kaizen, management, metrics, rating, stimulation

JEL Classification I23, I28, M12

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Oleksandr Velychko, Doctor of Economics, Professor, Expert in the accreditation of educational programs, Member of the Sectoral Expert Council "Social and Behavioral Sciences", National Agency for Higher Education Quality Assurance, Ukraine. (Corresponding author)

Svitlana Khalatur, Doctor of Economics, Professor, Head of Finance, Banking and Insurance Department, Dnipro State Agrarian and Economic University, Ukraine.

Nataliia Bondarchuk, Doctor of Public Administration, Professor, Head of Management and Public Administration Department, Dnipro State Agrarian and Economic University, Ukraine.

Mariia Bahorka, Doctor of Economics, Professor, Head of Marketing Department, Dnipro State Agrarian and Economic University, Ukraine.

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INTRODUCTION

Ukraine must be. Ukraine must be different now. Before the full-scale Russian invasion (Green et al., 2022), in Ukraine's post-Soviet higher education management system, separate mechanisms and institutions were established to improve the quality and efficiency of training specialists for the national economy in the context of European integration. For example, the government has attempted to differentiate financial support for universities according to their performance (Ministry of Education and Science of Ukraine, 2017). However, such funding did not become decisive for the development of higher education institutions (up to 20% and only from state grants) (CMU, 2019). This did not significantly encourage them to make profound changes and reform internal governance principles.

Another attempt was made to introduce a system of key performance indicators (KPIs) for university rectors (Ministry of Education and Science of Ukraine, 2021; The Verkhovna Rada of Ukraine, 2019).

However, both approaches are associated with significant risks of adverse effects described in Goodhart's law (Elton, 2004) and Campbell's law (Campbell, 1979). In the general context of those laws, the more quantitative indicators are used to regulate social processes, the more they encourage the performers to find simpler workarounds to achieve such indicators. Examples are biased assessment, publication in journals without double-blind review, fictitious contracts, purchase of co-authorship, diplomas, and certificates, etc. As a result, it can significantly distort the expected quality of the planned results and curtail the actual achievement of the government's targets. Moreover, it stimulates the artificial restraint of a significant excess of the KPIs level in the reporting year because this year will become the base year in the future.

Moreover, the regulation of external quality assurance of higher education in Ukraine is mainly carried out based on the direct influence of the subject (agency for quality assurance) on the object (university, educational program). However, such an influence is not balanced because it has not only strengths but also many weaknesses. The above facts, as well as a significant reduction in the government's financial capabilities because of the war, make more actual development and implementation of self-regulation systems of continual improvement of the quality and efficiency of Ukrainian universities.

1. THEORETICAL BASIS

The scientific research was based on the concept of the classical university, which was started by the cardinal J. H. Newman (Case, 2013) and German humanist A. Humboldt (Brandser, 2022). In addition, the rationalistic and providing logistics paradigm was considered (Velychko, 2014). The study is based on the principles of quantitative measurement (analytical metric) (Bloch et al., 2022), as well as the philosophy of quality improvement based on Total Quality Management (TQM) – (Pimentel & Major, 2016), and, in particular, KAIRYO (Mihai et al., 2014) and KAIZEN (Brauweiler & Zhakshylykov, 2020). Particularly, the metric in analytics is the value of the indicator at specific time points, which is used to measure the level of progress (Kumar & Venkatesan, 2021). Instead, an examination is a way of knowing a certain reality in cases where this reality is not subject to direct measurement, calculation, and sometimes even objective study (Boshuizen et al., 2020; Gümüsay & Amis, 2021).

Continual quality improvement is a crucial component of the well-known concept of TQM in the educational environment (Khurniawan et al., 2020). Moreover, the analysis of recent research shows that this issue is particularly relevant to higher education (Elken & Stensaker, 2018; Manatos et al., 2017). For example, Nasim et al. (2020) stipulate that the educational process often focuses exclusively on teaching and learning. Instead, their combination with research based on the business needs of different sectors of the economy is insignificantly taken into account (Khalatur et al., 2021; Vasylieva & James, 2021). Similar conclusions are drawn by Chen et al. (2017). These researchers emphasize that research, development, and innovation are often weak links in the quality of modern higher education. However, there are opposite problems. In particular, Barandiaran-Galdós et al. (2012) state that many educators, on the contrary, are overly focused on research because it usually grants them the highest prestige in the professional environment. In contrast, a side effect of such an approach is clear secondary importance in the qualitative renewal of educational content or continuous improvement of teaching methods.

The scientific research in evaluating the quality of higher education frequently tends to choose performance targets (Prescott, 2019; Williamson, 2019). At the same time, many studies, on the other hand, focus on significant criticism of the application of the metric approach to the objective established in the quality and effectiveness of educational activities (Peters, 2019; Spence, 2019). However, there are also supporters of a balanced approach, which focuses on combining the possibilities of expert review and a system of indicators in education (Lockett et al., 2015; Oravec, 2019).

At the same time, many researchers identify and summarize a wide range of disadvantages of using KPIs for universities. For example, Vican et al.

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(2020) determined that the typical attempt of administrators to use different dimensions to assess performance is one of the reasons for staff dissatisfaction. First, the problem here is the belief in the negative impact of the metric approach on the implementation of the educational mission and the maintenance of professional values.

According to Etzkowitz (2016), excessive enthusiasm can turn valuable quantitative criteria into a counterproductive force for higher education. In this context, T. A. Heffernan and A. Heffernan (2018) believe that universities manipulate different ratings to promote their own strengths in some places. One example of this is the promotion of misconduct and the application of various questionable practices in achieving performance indicators (Seeber et al., 2019). On the other hand, Bloch et al. (2022), based on the theory of organizational justice, defined different effectiveness of the metric approach depending on the educational environment of the country. Researchers also believe that using indicators can help eliminate informal networks of power in the academic environment. Moreover, Anderson et al. (2022) emphasize the positive impact of metrics on the process of academic career management and the involvement of qualified academic staff. To do this, it is important to consider practical recommendations for reducing the negative consequences of the local application of indicators for evaluation by specialists (Kulczycki et al., 2021).

Besides, Gunn (2018) considers that metrics and methodologies for measuring the quality of teaching in higher education can be successfully designed for efficient resource allocation. And one such resource is the contingent of students (Maldonado et al., 2021). In addition, a model of self-regulation can effectively stimulate the optimization of the distribution process (Byrnes, 1998). At the same time, some studies examine the positive impact of self-regulatory systems and strategies on academic achievement (El-Adl & Alkharusi, 2020; Ergen & Kanadli, 2017) and employee productivity (Pan & Sun, 2018). There is ample evidence that the correct use of quantitative information and a system of adequate metrics contribute to such results (Kahan et al., 2017; Servet & Çelik, 2021).

Instead, the existing research is not focused on an integrated application of the quantitative approach (Pearce & Pons, 2019) to support the process of self-regulation of continual improvement of the quality and effectiveness of higher education. However, now it is vital to develop a detailed methodology of the self-regulation system, as well as to adapt it to the new conditions of higher education institutions in Ukraine.

2. RESULTS

2.1. Features and methodology of the self-regulation system

A self-regulation system is a system that does not require the direct external influence of the subject of regulation on the object of regulation in order to change its state or behavior. The object of regulation must change independently due to the influence of specially created external stimuli on it. For stimulation, the study proposes to use quantitative measurement (metrics in analytics) and also summarizes its advantages and disadvantages compared to the expertise procedure (Figure 1).

However, this is not the only criterion that fundamentally distinguishes the proposed self-regulation system from the current accreditation system (Figure 2).

The creation of the self-regulation system methodology was phased. In the first stage, the quality segments and their influence in the system of national rating evaluation of the effectiveness of educational activities of universities were proposed. Among them: I – training by profession; II – science and research; III – innovation activities, works, and services; IV – educational and social activity. The combination of such components may determine the type or specialization of a modern higher education institution. The more segments the university is successfully involved in, the greater its ranking position as a subject of educational activity should be. Generally, to objectively assess the quality and effectiveness of such activities, the institution's representation in each segment must receive a different level of significance.

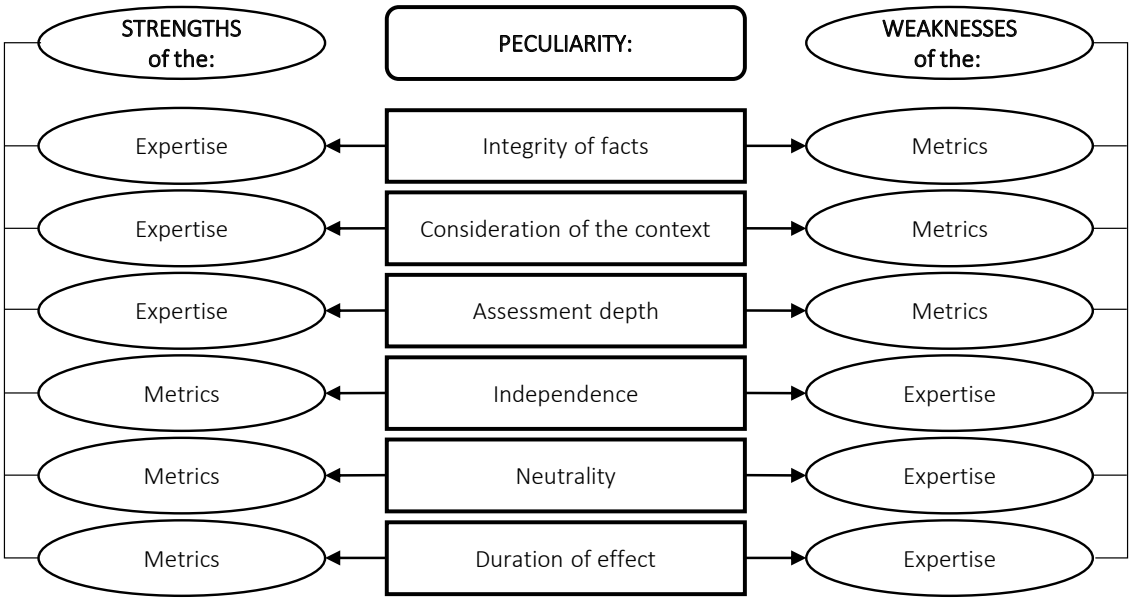

Figure 1. Strengths and weaknesses of metrics and expertise procedures in the process of assessing the quality of educational activities

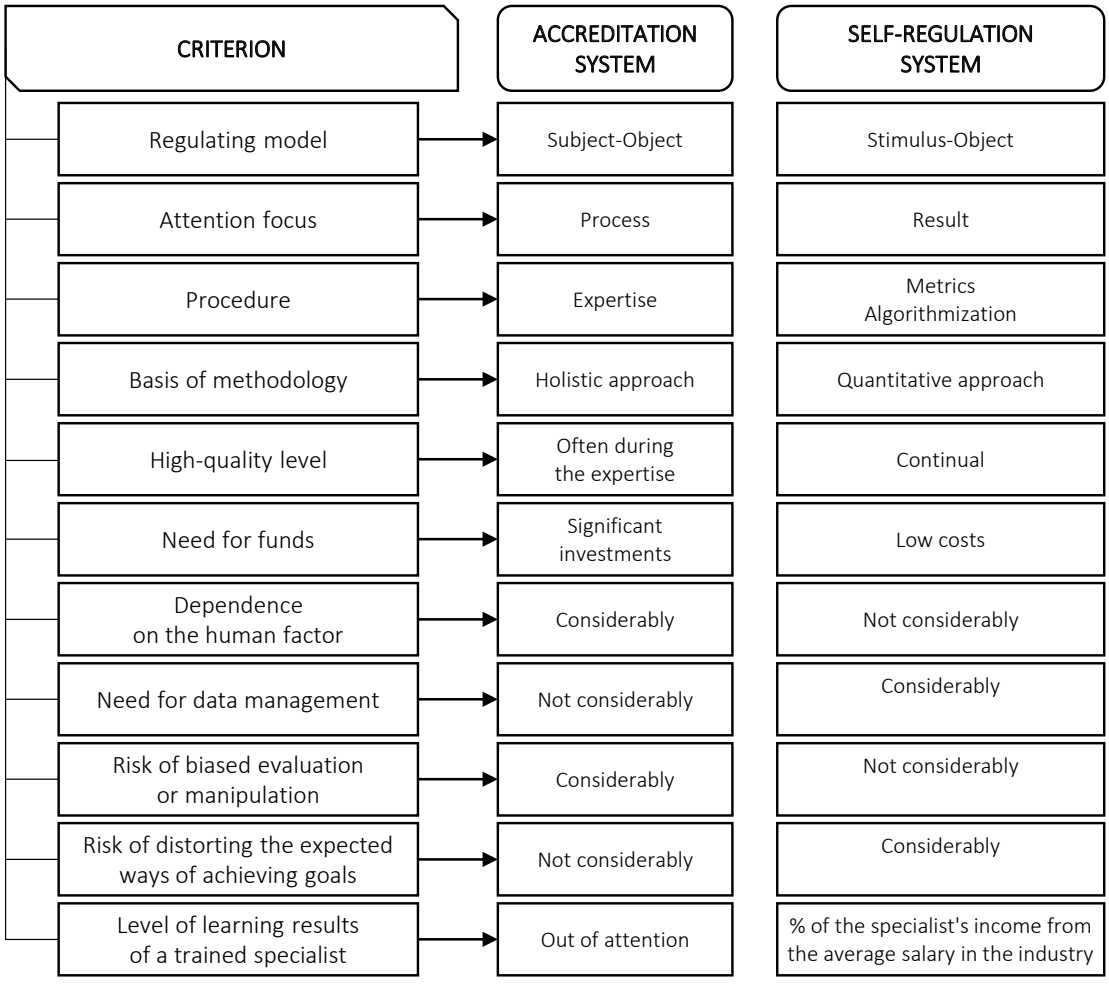

Figure 2. Main differences in the self-regulation and accreditation system of external assurance and improving the quality of higher education in Ukraine

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In the second stage, the main indicators for each segment of the rating assessment of the quality level at the educational mission by higher education institutions of Ukraine are identified. In addition, algorithms or methods for calculating such indicators are substantiated. Thus, the level of training in the profession is proposed to be assessed on the basis of the level of successful graduates who take part in the educational program in a particular field or area of current occupation (employment), for example, within 5-10 years after graduation. An essential measure of this can be such a relative indicator as the percentage of the official average annual income of university graduates from the average wages by industry (type of economic activity). Moreover, information from the Pension Fund of Ukraine, the State Statistics Service of Ukraine, or other database management systems may be used. An example of possible restrictions: the maximum value per person is 1000 %. In addition, the ratified Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data must be strictly adhered to (The Verkhovna Rada of Ukraine, 2010).

The calculation of the proposed indicator in the segment "Training by profession" should be carried out according to the following formula:

$$V_{T(1)} = \frac{\sum_{i=1}^{n} g_i}{n} \cdot \frac{1}{R}, \quad (1)$$

where $V_{T(1)}$ – the percentage of average annual income of graduates of higher education institutions from the average wages by industry, %; g – the percentage of average annual income of one graduate of a higher education institution from the average wages by industry, %; i – serial number of the graduate of the higher education institution from 1 to n; n – the number of graduates of higher education institutions who are taken into account and provided consent to the processing of their personal data; R – regional coefficient of the remuneration level (according to the location of the higher education institution).

While the percentage of the average annual income of one graduate of a higher education institution from the average wages in the economy will be equal to:

$$g = \frac{p}{b} \cdot 100\%, \quad (2)$$

where p – average annual income of one graduate of a higher education institution at the main place of work (employment), UAH; b – average annual salary in Ukraine by types of economic activity where the graduate was employed, UAH.

This approach will also restrain one of the most negative phenomena of modern higher education in Ukraine – the motivation of most universities to mass education and graduation of students with compromises on the quality of their training.

Achievements in the "Science and Research" segment are proposed to be assessed based on the quality and productivity of research activities, which are projected at the level of involvement in creativity and development of critical thinking in educational training. However, it is important to take into account the negative Ukrainian experience in recent years on the manifestation of this issue of Campbell's law and Goodhart's law. In particular, this applies to some standard practices of academic dishonesty in achieving performance targets (KPIs). Examples are ghostwriting, pseudo-authorship, fabricated references, poor academic quality, poor academic practice, etc. Therefore, the impact of such negative phenomena on the outcome of university rankings should be at least minimized. Thus, the calculation of the proposed indicator in the segment "Science and Research" should be carried out according to the following formula:

$$V_{S(1)} = \sum_{j=1}^{h} \frac{m_j \cdot q_j}{a_j} \cdot \frac{1}{w}, \quad (3)$$

where $V_{S(1)}$ – the level of annual publication activity of the employee at the main place of work, taking into account the indexation in the scientific and metric base, the coefficient of influence of publications, and the level of co-authorship, publications; m – publication with indexing in a particular scientific and metric database, units; q – publication impact factor and/or quartile; a – number of co-authors of the publication, persons; j – serial number of the publication from 1 to n; h – the number of publications of the higher education institution that are taken into account; w – the number of research and teaching staff at the main place of work.

Under this approach, the parameter q will significantly reduce unfair motivation for poor academic quality or poor academic practice. And parameter a will provide a deterrent effect for such a negative phenomenon as ghostwriting or pseudo-authorship. In addition, in the case of academic plagiarism in university publications for the current year, the indicator $V_{S(1)}$ will automatically halve. It is also crucial that the coefficient of influence of the publication on the quartile (Q) varies exponentially: at $Q4q = 1$; $Q3 - 2$; $Q2 - 4$; $Q1 - 8$.

The calculation of the proposed indicator in the segment "Innovation activities, works, and services" should be carried out according to the following formula:

$$V_{X(1)} = \frac{f}{w}, \quad (4)$$

where $V_{X(1)}$ – the amount of funds received by the higher education institution as a result of innovative projects, scientific and technical works, and services per employee at the main place of work, UAH; f – the amount of funds received by the higher education institution as a result of innovative projects, scientific and technical works and services, UAH; w– the number of research and teaching staff at the main place of work.

The proposed indicator is focused on practical implementation and commercial activities. Instead, non-profit grant funding for educational and research projects should be considered separately. Namely, as one of the aids to achieve a high level of the proposed indicators in the segments "Training by profession" and "Science and Research."

Given the role of higher education, according to the philosophy of J. H. Newman (Case, 2013) and A. Humboldt (Brandser, 2022), the social impact of an individual university should also be taken into account in the evaluation. In fact, the optimal combination of both strengths and possible weaknesses, direct and representative democracy, is proposed. And then, the general indicator in the segment "Educational and social activity" will be $V_{Z(1)}$ – the level of evaluation of the higher education institution based on the results of interactive expert and/or public voting with the use of means of identification of persons, points.

In the third stage, a method of transiting the level of dynamics of the rating position of a higher education institution into specific coefficients has been developed. It is expected that the ranking of universities will be determined annually for each of the four proposed segments separately. It will make it possible to calculate the rate (coefficients) of change in the rating position of a particular higher education institution in the current year compared to the previous one. Further, based on these changes, it is expedient to calculate the consolidated dynamics coefficient of rating positions of the university. However, this indicator must take into account the different levels of impact of each segment on the quality and effectiveness of educational activities. In addition, it is important to determine a specific range of variability to establish the level of impact and the actual annual level of significance of a particular segment to record on the basis of random selection. This approach is vital to reducing the predictability of the consolidated rating dynamics ratio. Such conditions of considerable uncertainty will better encourage universities to improve quality and efficiency in each segment because concentrating on only one or a few convenient areas this year could lead to a significant loss of positions. Therefore, it will reduce the risks of adverse effects from the achievement of universities' proposed KPIs in specific segments (according to Campbell's law and Goodhart's law). Because finding simpler workarounds to achieve the level of individual indicators may not provide the desired effect in the overall context. Therefore, it becomes more profitable to strive for comprehensive and accurate quality development of educational activities of the university.

The significance of indicators of each segment and the range of its variability should be set at the following level: (0.4-0.6) – training by profession; (0.2-0.4) – science and research; (0.1-0.3) – innovation activities, works, and services; (0.5-1.5) – educational and social activity. In total, any selected combination of the actual significance of the segments in the current year should be equal to 1. That is, it is annual matchmaking as a system of automatic selection of the level of influence of quality segments (Fernandes & Buchan, 2021; Roth, 2015). The task of the matchmaking strategy is to ensure equal conditions for all participants in the rating. One of the following possible combinations (0.5; 0.3; 0.2; 0.1) is given in the formula for calculating

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the consolidated coefficient of the annual dynamics of the university's ranking position:

$$K_C = \frac{D_T\,0.5 + D_S\,0.3 + D_X\,0.2 + D_Z\,0.1}{4} - K_A, \quad (5)$$

where K_C – consolidated coefficient of annual dynamics of rating positions of higher education institutions; D_T – dynamics of the rating position of the higher education institution in the group "Training by profession"; D_S – dynamics of the rating position of higher education institutions in the group "Science and Research"; D_X – dynamics of the rating position of higher education institutions in the group "Innovation activities, works and services"; D_Z – dynamics of the rating position of higher education institutions in the group "Education and social activity"; K_A – demotivating coefficient for the outsider's strategy.

An important indicator in this formula is the indicator K_A. The most significant potential losses in the dynamics of positions in the ranking can be received by universities that occupy the highest positions, and the smallest – universities, which are usually at the lower end of the ranking. Under such conditions, the permanent role of an outsider can be beneficial, as it ensures the stability of the consolidated ratio (K_C) at level 0. This will happen due to the zero nature of changes in positions in the ranking by segments because further reduction to last place is arithmetically impossible. Therefore, then the incentive to improve their activities, in general, is actually leveled. That is why the demotivating coefficient for the outsider's strategy was introduced. For any place in the ranking, such a coefficient motivates each university only to move forward. Another strategy is guaranteed losses due to continual improvement of competing institutions and the effect of K_A. Therefore, it has been proposed to use a demotivating coefficient at the level of 0.05 to 0.10.

In generalized form, the system of rating evaluation of educational activities of universities is given in the form of the Ishikawa diagram (Carvalho et al., 2021). This presentation makes it possible to simultaneously demonstrate the idea, principles, purpose, segments, indicators, and cause-and-effect relationships in the developed methodology (Figure 3).

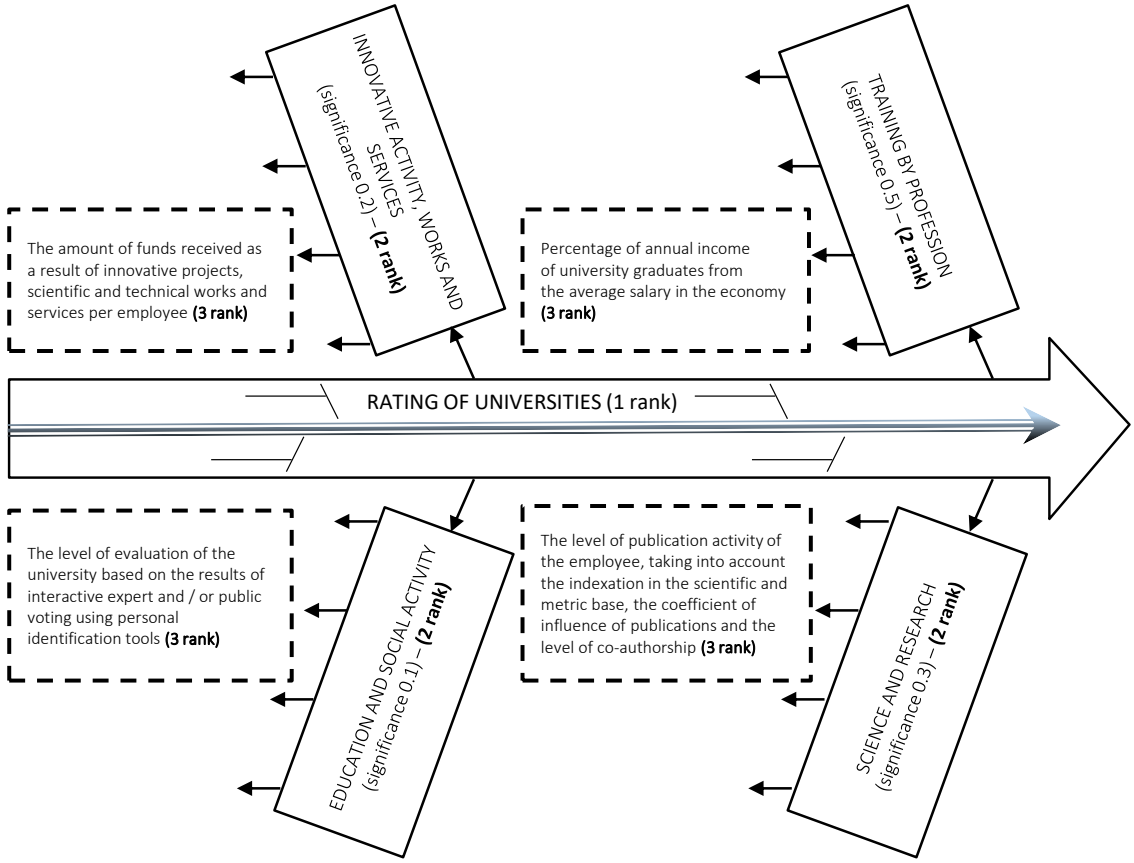

Figure 3. Ishikawa diagram with essential indicators of national rating in the higher education system of Ukraine

In the fourth stage, the incentive system for the quality and effectiveness of educational activities of the university is justified, taking into account the annual dynamics of its ranking positions. In particular, such dynamics will directly affect the quota for the maximum amount of student education in the current year (CMU, 2015). For the functioning of Ukrainian universities, the contingent of students is traditionally one of the determining factors in providing financial resources. At the same time, some students' tuition is paid by the government and the rest – by private customers of educational services. The incentive system provides the maximum number of licensing rights for the university in the current year by specialty and level of education. This requires the introduction of two intermediate indicators. In particular, the first of them: L_1 – the initial number of license rights for admission of students in the current year by specialty and level of education (established by the Ministry of Education and Science of Ukraine for each institution of higher education), places.

The second intermediate indicator should stimulate the marketing of educational services of higher education institutions:

$$L_2 = \frac{\sum_{r=1}^{3} v_r}{3} \cdot L_1 , \quad (6)$$

where L_2 – the used number of license rights for admission of students by specialty and level of education for the last three years, places; v – the number of students admitted to study in the r-th year by specialty and level of education; r – serial number of the year; 3 – number of last full years.

There has been an option for the last five years. Then atypical cyclical deviations in the volume of student enrollment will have less effect on the indicator's value. And for a new specialty, during the first years of formation (3-5 years), L_2 overall will not be present.

Finally, the third final indicator will stimulate the university to continuously improve the quality and efficiency of educational activities:

- in the training of specialists in a new specialty (up to 3-5 years):

$$L_3 = L_1 \cdot K_C , \quad (7)$$

where L_3 – acquired (lost) number of license rights for admission of students in the current year by specialty and level of education, places.

- after the gained experience of preparation of experts in a specialty (after 3-5 years):

$$L_3 = L_2 \cdot K_C . \quad (8)$$

And now, for the final result of the previous third stage, it remains only to transit the obtained consolidated coefficient of the annual dynamics of rating positions of higher education institution KC in the growth rate (decrease) of its licensing rights for admission to the current year. A range of 1% to 20% is proposed for such a transit (depending on the number of rating entities). At the same time, the more universities are evaluated, the smaller the rate of the increase (decrease) in the volume of licensing rights from the nature of the change in the position of the institution in the ranking, and vice versa.

2.2. Demonstration of the use of the self-regulation system

There is currently no national ranking of higher education institutions on the proposed quality segments and indicators. Instead, it is important to demonstrate the opportunities and possible results of implementing a system of continual improvement of the quality and efficiency of higher education. Therefore, to illustrate the use of the developed methodology, approximate data on 10 conditional universities and 10 specialties during the last two years (reporting and basic) were used. In addition, models of possible results for two typical situations have been created: positive and negative dynamics of rating positions of higher education institutions. The analysis of these indicators of rating assessment of Ukrainian universities showed the traditional potential diversity both by individual segments and by individual years (Table 1).

All that definitely affects the quality and efficiency of educational activities, as well as the consolidated rating. However, it was essential to consider each indicator's different level of impact (Table

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Table 1. Position of conditional universities of Ukraine in the system of national rating assessment

University	Year	Training by profession [*T*]	Science and research [*S*]	Innovative activity, works, and services [*X*]	Education and social activity [*Z*]
1	Reporting	2	1	7	3
	Base	5	2	3	6
2	Reporting	7	10	4	10
	Base	3	10	7	4
3	Reporting	1	2	8	2
	Base	10	1	4	3
4	Reporting	10	4	1	5
	Base	6	3	2	7
5	Reporting	6	3	5	1
	Base	4	4	5	1
6	Reporting	5	5	10	7
	Base	8	5	9	9
7	Reporting	3	6	6	9
	Base	2	6	8	10
8	Reporting	8	7	3	6
	Base	9	7	6	8
9	Reporting	9	8	9	8
	Base	7	8	10	2
10	Reporting	4	9	2	4
	Base	1	9	1	5

2). The two-year dynamics (reporting to the base year) made it possible to establish the nature of changes in the rating positions of each higher education institution. This was recorded as the initial value. Moreover, the final value is set taking into account each segment's initial value and current significance. According to the previously recommended range, the demotivation coefficient for the outsider's strategy in this situation was minus 0.05. In general, the final consolidated coefficient of the dynamics of the ranking positions of universities turned out to be quite diverse: from –2.1 to 3.375. At the same time, only 4 higher education institutions showed overall positive dynamics, while 6 universities mostly lost their positions for two years. All these results had a corresponding impact on the change in the scope of licensing rights of each institution shortly – i.e., the current year of admission.

The situation that characterizes the stated extreme positions in the rating deserves special attention (Tables 3 and 4). Although the pace of the change in such positions is difficult to consider as typical trends, yet the example of those institutions best demonstrates the potential of a self-regulatory system of continual improvement in the quality and efficiency of higher education. Definitely, as a result, much depends on the level of conversion K_C in the percentage increase (decrease) of the license volume. Currently, the number of rating entities is relatively small. Therefore, the maximum, previously recommended, option of compliance with the change of one position of the institution in the rating – increase (decrease) of the license volume at the level of 20%. In particular, for university No. 3, the conversion K_C = 3.375 means a significant increase of 67.5%, and for university No. 4, K_C = –2.1 records a decrease of –42%. Until recently, there has been a practice in Ukraine that the government set a separate license volume for each specialty of a higher education institution. Currently, this amount is regulated for the university as a whole (except for regulated professions). The developed methodology can be applied to both cases. In particular, the results are shown in terms of 10 specialties in Tables 3 and 4. There may be several educational programs within each specialty.

In addition, the acquired or lost number of license rights directly depends on the dynamics of the ranking position of each university in the current year. Moreover, this is a significant internal stimulus for continuous improvement of the quality and efficiency of educational activities in all seg-

Table 2. Conversion of dynamics of rating positions of conditional institutions of higher education of Ukraine in the consolidated coefficient

University	Value	Dynamics of rating position, reporting year to the base year (+/–)				On average, before taking into account the demotivating coefficient for the outsider's strategy (-0.05) [K_A]	Consolidated coefficient of dynamics in rating positions [K_C]
		Training by profession [D_T]	Science and research [D_S]	Innovative activity, works, and services [D_X]	Education and social activity [D_Z]		
		Impact on the consolidated ratio (significance level)					
		0.5	0.3	0.2	0.1		
1	Initial	+3	+1	–4	+3	–	–
	Final	1.5	0.3	–0.8	0.3	1.075	1.025
2	Initial	–4	0	+3	–6	–	–
	Final	–2	0	0.6	–0.6	–1.55	–1.6
3	Initial	+9	–1	–4	+1	–	–
	Final	4.5	–0.3	–0.8	0.1	3.425	3.375
4	Initial	–4	–1	+1	+2	–	–
	Final	–2	–0.3	0.2	0.2	–2.05	–2.1
5	Initial	–2	+1	0	0	–	–
	Final	–1	0.3	0	0	–0.7	–0.75
6	Initial	+3	0	–1	+2	–	–
	Final	1.5	0	–0.2	0.2	1,35	1.3
7	Initial	–1	0	+2	+1	–	–
	Final	–0.5	0	0.4	0.1	–0.075	–0.125
8	Initial	+1	0	+3	+2	–	–
	Final	0.5	0	0.6	0.2	1.15	1.1
9	Initial	–2	0	+1	–6	–	–
	Final	–1	0	0.2	–0.6	–0.95	–1
10	Initial	–3	0	–1	+1	–	–
	Final	–1.5	0	–0.2	0.1	–1.675	–1.725

Table 3. Licensed volumes of admission to the specialties of the university No. 3 in the current year (bachelor's level)

Specialty	Initial volume of license rights, places [L_1]	Used volume of license rights, places [L_2]	Consolidated dynamics ratio ranking positions of the university [K_C]	Conversion of [K_C] in % increase (+) in license volume (1 K_C = 20%), %	Acquired (+) number of license rights, places [L_3]	The actual number of license rights in the current year, places [$L_2 + L_3$]
1	50	22	3.375	67.5	+15	37
2	25	14	3.375	67.5	+9	23
3	75	35	3.375	67.5	+24	59
4	100	58	3.375	67.5	+39	97
5	50	27	3.375	67.5	+18	45
6	25	10	3.375	67.5	+7	17
7	50	50	3.375	67.5	+34	84
8	75	52	3.375	67.5	+35	87
9	150	110	3.375	67.5	+74	184
10	25	25	3.375	67.5	+17	42

ments. In addition, it deters the institution from one of the most common practices in Ukraine: mass training in many specialties. Now it is more appropriate to concentrate efforts only on those specialties in which the university can provide the highest quality and competitive training because the consolidated coefficient of the university's rating dynamics will only lose from the maintenance of inefficient, weak links and the scattering of resources.

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Table 4. Licensed volumes of admission to the specialties of the university No. 4 in the current year (master's level)

Specialty	Initial volume of license rights, places [L_1]	Used volume of license rights, places [L_2]	Consolidated dynamics ratio ranking positions of the university [K_c]	Conversion of [K_c] in % decrease (–) in license volume (1[K_c] = 20%), %	Lost (–) number of license rights, places [L_3]	The actual number of license rights in the current year, places [$L_2 + L_3$]
1	100	65	–2.1	–42	–27	38
2	25	22	–2.1	–42	–9	13
3	50	50	–2.1	–42	–21	29
4	120	92	–2.1	–42	–39	53
5	75	54	–2.1	–42	–23	31
6	30	18	–2.1	–42	–8	10
7	25	21	–2.1	–42	–9	12
8	75	70	–2.1	–42	–29	41
9	100	92	–2.1	–42	–39	53
10	50	27	–2.1	–42	–11	16

3. DISCUSSIONS

Previously, Velychko et al. (2018) suggested an operational plan to introduce a mechanism for external stimulation of the effectiveness of educational and scientific activities in Ukrainian universities at the stage of post-Soviet transformation. This plan included step II: "National Agency for Higher Education Quality Assurance (NAHEQA) to develop criteria for evaluating Ukrainian universities and methods for transiting the level of dynamics of the university's ranking position into specific coefficients." Now this task has been completed, and the basis of the self-regulation system methodology has acquired a complete form.

Thus, the process of optimal distribution of a significant amount of financial resources for the functioning of universities is not carried out directly but indirectly – through the creation of various opportunities for the formation of a contingent of students. Such opportunities directly depend on the stable and effective work of the higher education institution in various segments with motivation for integrity. In addition, these processes will take place naturally: without any influence or control of various state bodies and institutions. Moreover, the university still needs to be improved. Because the self-regulation system of continual improvement of the quality and efficiency of higher education is built in such a way as to ensure the goals of sustainable development. In particular, it is according to the well-known in competitive environment Red Queen effect: "For staying in the same position, you must necessarily move, and for being ahead, you need to move twice as fast" (Derfus et al., 2008).

Velychko et al. (2018) also emphasized the need for a reengineering strategy in the quality and efficiency management system of higher education in Ukraine. However, in 2019, the accreditation procedure for educational programs according to the new paradigm was launched (Ministry of Education and Science of Ukraine, 2019). The NAHEQA currently coordinates this process. The agency is state-owned and the only one in Ukraine. Such a reform has already contributed to progressive changes in the system of improving the quality of educational activities. The following could be mentioned: improving the needs of stakeholders, increasing publicity and transparency, promoting academic integrity, and so on. However, the motivation of universities for real continual improvements in quality and efficiency mostly remains low. The new procedure for accreditation of educational programs, in contrast to the previous ones, is based on the methodology of expertise without assessing any metrics. It is based on a holistic approach, as the integrity of the facts (Botti et al., 2018) and the principle of taking into account the context. The success of this approach depends on the human factor: the professionalism and objectivity of the subjects involved in accreditation. For example, it is not always possible to achieve a high level of independence and impartiality of quality evaluators, who usually work at another university. Of course, every evaluator signs a declaration of academic in-

tegrity, but it is not always possible to establish how much he/she actually adheres to it. Moreover, it requires significant investment through the support of a three-level system of the accreditation process:

1) evaluation of the educational program by an expert group;

2) verification of the conclusion of the expert group by the branch expert council;

3) consideration and adoption of the final decision by members of the NAHEQA.

Also, a common drawback of periodic expertise is often a cyclical change in the educational program's quality. In this sense, the metric, on the other hand, essentially guarantees independence and impartiality in assessing the quality of educational activities. However, it is much more at risk of distortion in the achieved content of the expected quality (Campbell's law and Goodhart's law). This may be due to fewer opportunities to consider the integrity of facts and context compared to expertise.

Therefore, it is promising to create a balanced dualistic model that focuses on both the process (evaluation through expertise) and the result (evaluation through metrics). In such a combined model, the accreditation expertise procedure will correspond to the concept of continual quality improvement KAIRYO. In contrast, the procedure based on metrics here will be more correlated with philosophy KAIZEN. KAIRYO-improving the quality of higher education in universities will involve the NAHEQA for generating new ideas and practices, implementation of technical and organizational changes, attraction of significant investment, periodic staff training, etc. Instead, the KAIZEN system is less costly and will further contribute to minor but continual improvements in the quality of educational activities in universities at every workplace, in every process, and in every function. Moreover, the KAIZEN system is self-regulated here because it does not involve external controlling (supplying) bodies or structures. In addition, the essential independence of the evaluation procedure in the self-regulation system from the human factor will significantly reduce the opportunities for unfair competition between educational programs and also, according to Bloch et al. (2022), will allow neutralizing the risks of creating informal power networks in the academic environment.

CONCLUSIONS

Focusing the existing model of accreditation expertise only on the educational process, without any consideration of its result, does not sufficiently restrain the harmful practices of massive low-quality training of specialists. Therefore, on the basis of the quantitative approach, an additional self-regulation system of continual improvement of the quality and efficiency of higher education should be built in Ukraine.

The system's functioning involves targeting segments with different levels of importance (I – training by profession; II – science and research; III – innovation, work, and services; IV – educational and social activities). Using quartiles, impact factors, and the level of co-authorship, as well as random matchmaking in the segments of quality, are ways to reduce the risk of adverse effects of Campbell's law and Goodhart's law. Moreover, one of the critical indicators for evaluation should be the percentage of the graduate's average annual income from the average wage in a particular area of employment or sector of the economy. However, for the effective functioning of the self-regulation system, it is desirable to have a relatively stable labor market. Therefore, this model is more recommended for the post-war period. The demotivating coefficient for the outsider's strategy, for any place in the rating, will stimulate each university only to progress.

Overall, the post-war system of ensuring and continuously improving the quality of higher education in Ukraine should be based on a balanced dualistic strategy. This strategy combines the advantages and the mutual correction of the disadvantages of two alternative approaches to assessing the quality and

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effectiveness of university educational activities: expertise and measurement. The current system of the NAHEQA is clearly based on accreditation expertise without signs of the metrics. Unlike the accreditation one, the additional system does not require significant capital investments and active direct influence of external bodies or structures. On the contrary, each university will independently strive for the most optimal structure, quality, and efficiency of educational services. The process of optimal allocation of financial resources for the functioning of universities will be carried out through variables rights to form a contingent of students.

Furthermore, the acquired or lost number of rights will constantly depend on the quality and efficiency of educational activities in the current year. As a result, this will motivate each institution to focus on training specialists only under the most high-quality and competitive educational programs. Universities will also be interested in raising their own qualification barriers for both applicants and students.

Further research should be aimed at identifying and eliminating weaknesses in the self-regulating system after its implementation and experience of practical use.

AUTHOR CONTRIBUTIONS

Conceptualization: Oleksandr Velychko.
Data curation: Oleksandr Velychko, Nataliia Bondarchuk.
Formal analysis: Oleksandr Velychko, Svitlana Khalatur.
Funding acquisition: Oleksandr Velychko, Mariia Bahorka.
Investigation: Oleksandr Velychko, Mariia Bahorka, Svitlana Khalatur.
Methodology: Oleksandr Velychko.
Project administration: Oleksandr Velychko, Svitlana Khalatur.
Resources: Nataliia Bondarchuk, Mariia Bahorka.
Software: Svitlana Khalatur, Mariia Bahorka.
Supervision: Oleksandr Velychko, Mariia Bahorka.
Validation: Svitlana Khalatur, Nataliia Bondarchuk.
Visualization: Nataliia Bondarchuk.
Writing – original draft: Oleksandr Velychko.
Writing – review & editing: Oleksandr Velychko, Svitlana Khalatur, Nataliia Bondarchuk, Mariia Bahorka.

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