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Article

Theoretical Basis and Complex Methodology of Assessing The Efficiency of Intellectual Services in The Higher Education System

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Abstract: This article provides a comprehensive theoretical framework and comprehensive methodology for assessing the effectiveness of intellectual services in the higher education system. It also analyzes the specifics of intellectual services, including their intangible properties, the intensity of knowledge and its important role in scientific and scientific activities. The proposed methodology combines qualitative and quantitative assessment tools to measure service efficiency, effectiveness, and impact on educational outcomes. By applying this approach, higher education institutions can better understand the value created by intellectual services, optimize resource allocation, and improve overall institutional performance. The result of the study contributes to the development of assessment practices in the field of education management and emphasizes the need to make decisions aimed at improving the quality and competitiveness of higher education.

Keywords: intellectual services, higher education, efficiency, evaluation criteria, digital technologies, innovation.

1. Introduction

Today, the higher education system is rapidly developing on a global scale, undergoing a transformation through new technologies, digital platforms, and innovative approaches. More precisely, in certain areas of education, not only traditional educational processes but also intellectual services - such as scientific research, analysis, innovation development, consulting, creation of educational products, and provision of online and offline services - are increasingly taking on a wider role.

Intellectual services are the processes of creating, distributing and providing services for intellectual and information products, which are one of the main manifestations of scientific potential and innovative activity in higher education institutions. In particular, these services are of great importance in such areas as improving the quality of education of students, developing the scientific potential of teachers, strengthening the position of universities in international rankings, and establishing cooperation with business and government structures[1].

At the same time, the issue of accurately assessing the effectiveness of intellectual services is quite relevant. Because not only their quantity or availability is important, but also their quality, that is, the level of their impact on the educational process, the economy and social development. For example, startups, patents, scientific articles, international cooperation projects, digital products and consulting services created by universities determine the effectiveness of intellectual services.

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2. Materials and Methods

Moreover, competition in the modern higher education system is becoming so intense that universities must stand out not only for the quality of education, but also for their innovative potential, intellectual services, scientific activity, the level of use of digital technologies, and the added value they create for society[2]. Therefore, there is a growing need to develop and implement scientifically based, accurate, and comprehensive methods for assessing intellectual services.

The concept of intellectual services is one of the widely discussed topics in the world and local scientific literature. Each scientist illuminated this field from its own aspects and proposed different theoretical approaches.

In his famous work "The Rise of the Network Society", Manuel Castells sees intellectual services as a key factor in promoting innovation, shaped by the influence of global networks. In his opinion, intellectual services are the main drivers of an innovative economy, ensuring maximum efficiency of human capital and information resources[3].

At the same time, Karl-Erik Sveiby, in his work "The New Organizational Wealth", emphasizes the management of intangible assets and corporate knowledge as an important aspect of intellectual services. In his opinion, the correct valuation and effective use of intangible assets in higher education institutions increases the prestige of the institution[4].

Uzbek scientist A. Mamatov emphasizes the need to take into account innovative projects, scientific articles of professors and teachers, and international cooperation when assessing the effectiveness of intellectual services in educational institutions. In his theory, effectiveness should be assessed not only through quantitative indicators, but also through qualitative indicators[5].

Sh. Juraev also considers it important to take into account the widespread use of modern digital technologies, electronic platforms, and distance learning services when assessing intellectual services in the education system. In his opinion, a deep analysis of the relationship between digital technologies and intellectual services is a key factor in increasing the effectiveness of the modern education system[6].

Theoretical analysis, comparative analysis and empirical analysis methods were used in the article.

First of all, the scope of intellectual services in the higher education system, their main directions and functions were studied.

Secondly, the criteria for efficiency assessment were defined: the number of scientific articles and patents, the effectiveness of innovative projects, the intellectual potential of professors and teachers, the level of use of digital platforms.

Thirdly, an integral index of their assessment was created.

3. Results and Discussion

Currently, the issue of improving the efficiency of intellectual services of higher education institutions is of particular importance. As the analysis of sources on scientific literature shows, various methods for assessing the efficiency of intellectual services of higher education institutions have been studied, and these methods are widely used in practice and have significant advantages.

Each assessment methodology consists of a system of indicators that, to a certain extent, reflect certain features and aspects of the effectiveness of intellectual services of higher education institutions[7]. Depending on the purpose, scientists have proposed various approaches to assessing the effectiveness of intellectual services of higher education institutions, namely, the advantages and disadvantages of economic, regulatory, rating, expert methods (Table 1).

Table 1. Approaches to assessing the effectiveness of intellectual services of higher education institutions

Content	Advantages	Disadvantages
Economic approach		

Traditional economic indicators involve evaluating a higher education institution as a business entity using accounting and other financial and economic reporting data selected as evaluation indicators.	This is an effective tool for identifying reserves within the farm, and the basis for developing scientifically based plans and management decisions.	It can be used by an educational institution to assess its own situation and the dynamics of various economic indicators. Difficulties in collecting information about other higher education institutions.
Regulatory approach		
This includes assessing the quality of educational services and the educational process in terms of compliance with state requirements, according to state educational standards for educational levels and individual educational programs, using various indicators of regulatory procedures (licensing, accreditation).	A comprehensive evaluation procedure for higher education institutions is mandatory, and education quality control is carried out by the education inspectorate.	Using this approach is not sufficient to assess the effectiveness of a university's intellectual services .
Rating approach		
It is one of the traditional methods widely used to assess the effectiveness of intellectual services in higher education institutions. Based on the scientific potential of higher education institutions, their faculty, student achievements, and research results, they are ranked in national or international rankings[8]. It evaluates separate selection criteria. Typically, the main parameters in compiling the rating are the potential of the higher education institution, its intellectual property, staffing, study conditions for students, material and technical base, as well as the activity of the higher education institution, that is, the number of graduates, indicators in doctoral studies, scientific achievements, etc. This approach allows for a more accurate assessment of the competitiveness and effectiveness of intellectual services of educational institutions.	The criteria under evaluation will help potential consumers, employers and higher education institutions to navigate among various HEIs operating in the market of educational services, in particular, intellectual services. The publication of the ratings will allow HEI management to assess their position in the competitive environment of the effectiveness of intellectual services and inform the general public about the place of HEIs in the regional, national or global educational services markets[9].	In most cases, the selected indicators cannot be calculated with absolute accuracy, which can lead to significant differences in the positions of universities in the ranking. Any small differences in the integrated scores of the analyzed universities do not always indicate the superiority of one university over another.
Expert approach		
This is the intellectual property of the university. services involves an assessment of the effectiveness of a university's intellectual services by a group of experts according to certain criteria. Experts usually refer to the main criteria for assessing the effectiveness of a university's intellectual services: diversification of educational programs, cost of commercial education, quality of	Assessing one's own capabilities and the capabilities of competitors by conducting special expert research. Widely used in practice, since statistical data characterizing the level of development of higher education institutions are	of higher education institutions is subject to subjectivity and dependence on the human factor. The assessment process depends on the experience and level of knowledge of experts, and sometimes subjective decisions can be made[10]. In addition, the results of the examination should be

the educational process, qualifications of teachers, image of the university, opportunities for obtaining additional knowledge, website on the Internet, level of research work of the university, number of innovative developments, quality of scientific articles and their publication rate in international scientific journals.	not always available to a wide range of people, and there are not many quantitatively expressed assessment criteria.	carefully processed, since the opinion of one expert, which significantly differs from the opinions of all other experts, may be the most correct.
Assessment based on artificial intelligence and digital learning		
Artificial intelligence and machine learning algorithms enable automated evaluation of intellectual services in higher education institutions. This method uses neural networks and machine learning models to predict the effectiveness of research activities.	the university's research and development activities are analyzed, and future innovation trends are predicted. It is widely used in practice. This allows us to draw comprehensive conclusions on improving the efficiency of intellectual services of universities .	of the university is objective and independent of the human factor and thinking. In addition, the obtained results should be corrected and carefully processed based on a comparison of the LSR with the real situation .

According to the results of the study, the main shortcomings of existing approaches to assessing the effectiveness of intellectual services of higher education institutions are the predominance of the predominantly qualitative nature of the assessment, the lack of a set of scientifically based integrated indicators. This, in general, leads to the fact that the achieved results, the concentration is more on the HEI factor, the resource base - primarily educational and methodological, personnel, material and technical support, which reduces the overall reliability and objectivity[11].

Modern universities today are becoming not only an educational institution, a place of concentration of scientific developments and fundamental knowledge, but also an important direction for increasing the efficiency of intellectual services, achieving the balance of supply and demand in the innovation market and playing the role of an important entity that determines the pace of its development, structure and implementation processes. Universities are not only part of the innovative ecosystems being created in the regions, they have all the conditions and opportunities to become an integrated part of such a system.

There are many approaches to assessing the performance of higher education institutions in our republic and a highly publicized methodology for assessing their effectiveness[12]. However, in our opinion, the main point is that it is necessary to approach the assessment of higher education institutions as elements of the regional innovative environment taking into account these parameters. It is especially important to understand the role of higher education institutions not only as centers for training qualified personnel, but also as a key link in the production of new knowledge and the creation of new jobs.

Given these circumstances, the main indicators should be indicators that determine the level of development of intellectual services of higher education institutions.

The effectiveness of intellectual services in universities involves a number of steps:

1. The assessment of the effectiveness of intellectual services is carried out in relation to the formation of a list of higher education institutions . The methodology does not provide for restrictions on the maximum number of HEIs , but since the experiment is based on comparison, their number cannot be less than two.

The approach proposed by us allows us to assess the effectiveness of intellectual services of higher education institutions in the Republic of Uzbekistan, since its set of indicators is general and popular .

be formed according to the following criteria :

a. region of location (requires assessment within a specific territorial or republican entity);
b. regional or national research universities;
c. specialization (allows you to compare the competitiveness of universities of economic, medical or other fields with similar higher education institutions).

2. Determining the sum of individual and aggregate indicators of the efficiency of intellectual services, forming their groups.

the effectiveness of intellectual services is assessed are grouped into the following functional groups:

a. performance indicators of intellectual services ;
b. Performance indicators of educational institutions documented in self - inspection reports.

Understanding the mission and goals of an educational institution – " To improve the efficiency of intellectual services through the development of scientific and educational potential" " Increase " a list of competitiveness indicators that defines the structure and content, allows it to be evaluated from different perspectives.

The Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030 was developed based on the needs of the social sphere and economic sectors of the higher education system, in order to improve the quality of education, train competitive personnel, effectively organize scientific and innovative activities, and develop international cooperation based on ensuring a strong integration of science, education, and production, as well as in accordance with the Resolution of the President of the Republic of Uzbekistan No. PQ-4391 dated July 11, 2019 [13] " On measures to introduce new principles of management in the system of higher and secondary specialized education " .

3. Data collection is based on self-assessment reports of higher education institutions as the main source of information, as well as Scopus, Web of Science and Includes the use of SciVal information resources of higher education institutions form self-audit reports in accordance with the established procedure and post information on their official websites, which forms the empirical basis of the study.

Bibliometrics and abstract databases Scopus and Web of Science as a means of tracking the citation of articles published in relevant journals makes them a valuable analytical tool that allows assessing the level of scientific activity and research potential of an educational institution[14].

SciVal integrated modular platform, which provides for the presentation and evaluation of research results in all areas of science, made it possible to obtain reliable and comprehensive information about the scientific performance of the educational organizations being evaluated[15].

Thus, the presented data sources formed the empirical basis of the study and a set of specific indicators, the further processing and analysis of which helped to assess the competitiveness of an educational organization of higher education.

4. Improve the efficiency of intellectual services The ratio of private evaluation indicators is determined as follows:

$$I_{ij} = \frac{K_{ij}}{K_{i\max}}, \qquad (1)$$

where : I_{ij} – the value of the i - th private indicator of the efficiency of intellectual services for the j - th educational institution being evaluated the ratio of the i in the middle to the maximum value of the indicator;

K_{ij} – the value of the i - th private indicator of the efficiency of intellectual services for an educational institution ;

$K_{i\,max}$ – the maximum value of the i-th indicator for the educational institutions being evaluated.

The maximum value is determined for each i-indicator. This methodology involves comparing the best value of parameter i among HEIs, not with a specific educational institution. Consequently, the resulting ratio characterizes the compliance of a given educational institution with the adequate value of the parameter among the objects of assessment of the efficiency of intellectual services i[16] .

5. The assessment of the overall indicators of the effectiveness of intellectual services of educational institutions is as follows :

$$K_{ij}^{V} = \frac{1}{n} \times \sum_{i=1}^{n} I_{ij} \quad , \quad (2)$$

here : K_{ij}^{v} - j – the effectiveness of intellectual services for an educational institution the value of the overall indicator;

I_{ij} - the ratio of the value of the i-th private indicator of the efficiency of intellectual services for the j-th educational organization to the maximum value of the i-th indicator among the educational organizations being evaluated .

6. Rating of the significance level of the generalized indicators is carried out in order to determine the importance of each indicator for assessing the effectiveness of intellectual services in the educational services market.

Involves the formation of a group of experts who conduct a survey using the method of sociological surveys using modern communication channels , and the research is carried out using the questionnaire method using modern communication channels. In the process of research[17], experts from the Education Quality Inspectorate of our country can draw conclusions about the relative importance of m- generalized indicators of competitiveness assessment. The most important indicator is given m -color , then - (m-1), etc.; color 1 is considered the indicator with the least importance . The results of expert surveys are summarized in Table 2.3 , and in the last row they represent the sum of the colors assigned by experts to a specific indicator (Table 2, Formula 3):

$$L_j = \sum_{i=1}^{n} = Z_{ij} \ , \quad (3)$$

where: L_j – the sum of the values of the colors of the jth indicator.

Table 2. Determining the order of rating evaluation by color

Experts	Indicators					
	X_1	X2	X3	X4	...	X_m
1	Z_{11}	Z_{12}	Z_{13}	Z_{14}	...	Z_{1m}
2	Z_{21}	Z_{22}	Z_{23}	Z_{24}	...	Z_{2m}
3	Z_{31}	Z_{32}	Z_{33}	Z_{34}	...	Z_{3m}
4	Z_{41}	Z_{42}	Z_{43}	Z_{44}	...	Z_{4m}
…	...	...	...	...	...	...
n	Z_{n1}	Zn_2	Zn_3	Z_{n4}	...	Z_{nm}
	R_1	R_2	R_3	R_4	...	R_m

The weight coefficient value of a specific generalized indicator is determined by the following formula:

$$F_j = \frac{L_j}{\sum_{j=1}^{m}} \ , \quad (4)$$

7. The weight of the specific aggregated indicator value is calculated as follows:

$$KS_i = \sum_{i=1}^{n} F_j \times K_{ij} \ , \quad (5)$$

The efficiency of intellectual services in a certain group of indicators of higher education institutions is calculated by summing the values obtained by formulas 2.5 and 2.6 :

$$KS_j = \sum_{i=1}^{n} KS_i , \quad (6)$$

9. The calculation of the generalizing (integral) indicator of the efficiency of intellectual services is carried out according to formula 2.7:

$$KS_c = \frac{1}{n} \times \sum_{i=1}^{n} KS_a , \quad (7)$$

These indicators represent the following :

a. of efficiency of intellectual services ;
b. himself The level of competitiveness, which is assessed by the performance indicators of the universities it is obliged to assess[18] .

The values of each indicator can fluctuate in the range from 0 to 1 , and accordingly, allow the achieved level to be expressed graphically[19].

Thus, a distinctive feature of the integrated methodology for analyzing the mechanism for increasing the efficiency of intellectual services of higher education institutions in the educational services market is its usability and high adaptability to the variability of external and internal environmental parameters .

4. Conclusion

This article provides an in-depth analysis of existing approaches to assessing the effectiveness of intellectual services in the higher education system of Uzbekistan. The results of the study showed that the existing assessment methods mainly focus on qualitative indicators, which reduces the overall objectivity and reliability. Therefore, based on the comprehensive approach proposed in the article, a system of specific indicators, weighting coefficients, an integrated index and rating criteria were developed for assessing the effectiveness of intellectual services.

This approach allows for a comprehensive assessment of the effectiveness of scientific, innovative, educational and digital activities of higher education institutions, determining the level of competitiveness and making clear strategic decisions to improve them.

The study also revealed prospects for the use of modern digital tools and automated assessment methods based on artificial intelligence. This will ensure the effective functioning of universities in their innovation ecosystems, making them leading entities not only in the local but also in the international market.

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