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AREAS OF THE MODERNIZATION OF THE LITHUANIAN HIGHER EDUCATION SYSTEM: A CASE FOR UKRAINE

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The article presents the experience of the Republic of Lithuania in moderni-zing higher education. The method of document analysis was used, in particular, data from the European statistics, national statistics departments, and the State statistics service of Ukraine. The application of the method of generalization and comparison made it possible to compare the transformations of higher education systems in Lithuania and Ukraine.

A number of problems typical for both countries that led to the introduction of a set of measures to improve the quality of educational services were found. They are the following: insufficient compliance with the requirements of employers, bureaucratization, mainly theoretical training, low competitiveness of graduates of higher education institutions in the labor market, slow introduction of modern information and communication technologies, outflow of young people to study in other countries of the European Union, and insufficient funding.

The correlation between the introduction of effective mechanisms for monito-ring higher education and the growth of the quality of educational services is demonstrated using the example of the Republic of Lithuania. It was found that the combination of two levels of monitoring – internal self–assessment and external expert quality assessment – gives the best result.

The article analyzes the dynamics of total expenses for training of one student in the context of funding sources, which indicates the predominance of state funding in the higher education sector in Lithuania. The criteria used to determine the amount of funding for Lithuanian higher education institutions are given, in particu-lar: the effectiveness of their research activities, the number of students, and the success of implementing the University's strategic development plans.

The directions of funding sources diversification for universities are defined, namely: promotion of cooperation between business entities and the scientific sphere in the areas of commercialization of research results and protection of intellectual property rights; attraction of funds from foreign sources; activation of cooperation between higher education institutions and business entities; creation of special centers for the commercialization of scientific research at universities. The key principles for implementing these measures are consistency, complexity, sequence and coherence of the elements of the four-link spiral Quadruple Helix (education – government – business – the public).

Key words: higher education, modernization of the Lithuanian higher education, quality of educational services, financing of higher education in Lithuania, diversification of financial sources in the higher education, commercialization of research results

У статті наводиться досвід Литовської Республіки щодо модернізації вищої освіти. Використано метод аналізу документів, зокрема, дані сайтів Європейської статистики, національних департаментів статистики, Державної служби статистики України; застосування методу узагальнення і порівняння дало можливість співставлення трансформацій систем вищої освіти Литви та України.

Виявлена низка типових для обох країн проблем, які спричинили запровадження комплексу заходів з метою підвищення якості освітніх послуг: недостатня відповідність запитам роботодавців, забюрократизованість, переважно теоретизоване навчання, невисока конкурентоспроможність випускників вищих навчальних закладів на ринку праці; повільне впровадження сучасних інформаційно-комунікаційних технологій; відтік молоді на навчання до інших країн Європейського Союзу; недостатність фінансування.

На прикладі Литовської республіки продемонстровано кореляційний зв'язок між запровадженням дієвих механізмів моніторингу вищої освіти та зростанням якості освітніх послуг. З'ясовано, що поєднання двох рівнів моніторингу – внутрішньої самооцінки та зовнішньої експертної оцінки якості – дають найкращий результат.

Проаналізовано динаміку сукупних витрат на підготовку одного студента у розрізі джерел фінансування, яка свідчить про переважання державного фінансування в секторі вищої освіти Литви. Наведено критерії, за якими визначається обсяг фінансування литовських вищих навчальних закладів, зокрема: результативність їх науково-дослідної діяльності, чисельність студентів, успішність реалізації стратегічних планів розвитку університету.

Визначено напрями диверсифікації джерел фінансування університетів: сприяння співробітництву суб'єктів підприємницького сектору й наукової сфери у напрямах комерціалізації результатів досліджень та захисту прав інтелектуальної власності; залучення коштів з іноземних джерел; активізація співробітництва вищих навчальних закладів із суб'єктами підприємницького сектору; створення при університетах спеціальних центрів з комерціалізації наукових досліджень. Ключовими принципами реалізації вказаних заходів є системність, комплексність, послідовність та узгодженість елементів чотириланкової спіралі Quadruple Helix (освіта – уряд – бізнес – громадськість).

Ключові слова: вища освіта, модернізація системи вищої освіти Литви, якість освітніх послуг, фінансування вищої освіти в Литві, диверсифікації фінансових джерел у системі вищої освіти, комерціалізація результатів наукових досліджень

Introduction. One of the characteristic features of the information economy is the growing role of sectors and industries capable of generating new knowledge, innovations, ideas, inventions, developments, technologies. It increases the interest of researchers and practitioners in the development and modernization of higher education in a particular country as a sector in which the intense intellectual and innovative potential of the state is consolidated.

The application of the economic principles in the higher education sector transforms higher education institutions into enterprises to which the state-aid rules are applied. It has implications for financial support systems designed for students: study grants and/or loans provided to students on condition that they enter a course offered by a higher education institution. It is mainly the case where the existing rules distinguish between higher education providers whose courses are eligible for such funding and those higher education providers who offer courses that are not eligible for such funding (Hoogenboom, 2015).

Higher education in Ukraine, even with significant potential, is not characterized by high parameters of competitiveness in the global market of educational services. The domestic researchers' findings remain virtually unclaimed by the business sector, and, accordingly, not commercialized and not implemented in the production process. Further socio-economic growth of the country in the context of globalization and high dynamism of the external economic environment is possible only in case of the intensification and efficiency of research, innovation and educational activities of modern higher education institutions. It is worth emphasizing the importance of establishing active cooperation between the elements of the four-link Quadruple Helix (education – government – business – the public).

Relevant for Ukraine in this context is the study of the world experience, the research into the effective models of higher education in order to identify the world best practices and adapt them to domestic realities, practice, legislation, mentality. In particular, the experience of the Republic of Lithuania is quite impressive, taking into account common features in the national systems of higher education and the experience gained by Lithuania during its membership in the European Union.

Literature review. The problems of the development of higher education in the leading countries of the world, including those of the European Union, are studied by such Ukrainian researchers as Kalenyuk I., Chukhno A., Antonyuk L., Kuklin O., Tsymbal L., Bogolib T., Grishnova O., Varnaliy Z., Satsyk V., Motova G., Verbytska A., Konogray V. and others.

Roffe (1996) studied the trends of developing higher education managers in Lithuania. The researcher has developed a transformational model of assistance to educational managers, taking into account the organizational and cultural changes, as well as the changes in management skills. The teachers and university lecturers, as well as the challenges they faced in the light of Lithuania's educational reforms, were also in the research focus (Rutkienė & Ponomarenko, 2019). Lithuania has often been the subject of comparative studies, in particular the education system (Godoń et al., 2004), the impact of gender on educational attainments (Katus et al., 2007), as well as the representation of gender parity in higher education (Friedhoff et al., 2019), and cooperation with countries in the field of higher education (Ewert, 2012).

The Lithuanian education is described through the prism of equal access to it, taking into general account population, and unequal learning opportunities for all (Ballas et al., 2017), the impact of the European Union policy on access to higher education (Weedon & Riddell, 2012), and access of adults to higher education (Saar et al., 2014). Even though the availability of thorough scientific publications on the research topic, a detailed analysis of the world experience of the modernization of the higher education system in different countries (within this article – the Republic of Lithuania) is appropriate.

Methodology. In preparing the article, the official data of the websites of the European Statistics, national departments of statistics, the State Statistics Service of Ukraine were used. The methods of generalization and comparison made it possible to analyze the state of higher education in the Republic of Lithuania and Ukraine.

The purpose of the article is to identify the current trends and problems of the modernization of the Lithuanian higher education system, as well as to identify the applied principles of the commercialization of the university research results.

Main Part. The Lithuanian experience of the modernization of the higher education system can be quite applicable for Ukraine because of the presence of similar features and conventional approaches to:

– the definition of groups of higher educational institutions: universities and colleges (Friedhoff, Werner & Roman, 2019);

– the existing educational and qualification levels: the first – the Bachelor's degree; the second – the Master's degree; the third – the Doctoral degree (Ewert, 2012);

– the determination of the degrees of the educational process organization – modular and semester-based;

– the combination at higher education institutions of educational, upbringing and research activities (requirements for the presence of a correlation between the research topics and academic disciplines; at least 50% of the research and teaching staff must be researchers) (Friedhoff, Werner & Roman, 2019);

– the legally declared priority of expanding cooperation within the quadruple "Quadruple Helix" (education – government – business – the public);

– the predominance of the number of state higher education institutions (27 in Lithuania in 2015) over the private ones (19) in the structure of institutions subordinated to the Ministry of Education (Ewert, 2012; Viliunas, 2007). As of the beginning of 2015, structurally higher education in the Republic of Lithuania was represented by 14 public and 8 private universities, 13 public and 11 private colleges. In general, in Lithuania, there are about 150 thousand students, of which about 4000 persons are foreigners (Ballas, Dorling & Hennig, 2017; Ewert, 2012; Viliunas, 2007).

The conducted economic and statistical analysis revealed the following key trends in the development of the Lithuanian higher education:

- the significant influence of the demographic factor on the dynamics of the student part of higher education institutions;
- the optimization of the structure of higher educational institutions in the country;
- the significant share of people with higher education among the population aged 20-34 (in 2013 – 51.3%, in 2015 – 57.6%; for comparison: the average value in the European Union in 2015 – 38.7 %) (Ballas, Dorling & Hennig, 2017; Deuten, 2009);
- the predominance of the number of undergraduate students over the number of Master's students (more than 60% in 2016 and 65% in 2019);
- the reduction of the share of the adult population among the students of the Lithuanian universities;
- the reduction of the number of graduates (by 5213 people during 2015 – 2019) (see Table 1);
- the low demand for entrants for services of vocational education institutions;
- the student mobility – departure to study in other countries of the European Union;
- the migration of scientific personnel abroad.

Table 1

Number of university graduates

	Number of university graduates, persons				
	2015	***2016***	***2017***	***2018***	***2019***
Total by the grade of education	22,578	20,747	19,324	18,219	17,365
Bachelor programs	13,486	12,318	11,203	10,744	10,101
Master's programs	8,126	7,461	7,227	6,534	6,482
Doctoral programs	382	286	296	313	287
Non-degree studies (professional programs and residency)	606	693	613	639	685

Note: Adapted from "Official Statistics Portal" at https://osp.stat.gov.lt/EN/statistiniu-rodikliu-analize?hash=e3188212-0d84-4a0d-92f6-1cbe037fc776#/. Copyright 2020 by the National Agency for Education.

After joining the European Union, Lithuania has faced the urgent need to modernize the higher education system, which was characterized by several problems, including those typical for Ukraine. These problems mainly concerned:

- the quality of educational services – the outdated educational content, insufficient compliance with the demands of employers, over-bureaucratization, mostly theorized training, slow implementation of pedagogical innovations;
- the effectiveness of educational activities – low competitiveness of the graduates of higher education institutions in the labour market;
- the efficiency of research activity – the underdeveloped mechanisms of transfer and commercialization of research results, their inconsistency with the needs of the business sector;
- logistics – the morally and physically worn-out equipment and facilities necessary for the implementation of the research and educational activities, the slow introduction of modern information and communication technologies;
- the demographic situation – the reduction of the student part of the universities, the outflow of young people to study in other countries of the European Union;
- the financial aspects – the lack of funding, low level of diversification of financial sources, insufficient development of fundraising activities.

It should be noted that Lithuania has not yet managed to eliminate the problems mentioned above. However, there is systematic progress towards their solution or minimization. The Lithuanian universities, as well as the higher education institutions of other European Union countries, recognize the fact that in the information society era and at the stages of the information economy development the following principles need to be considered and implemented as a matter of priority: flexibility (quick response to external challenges), malleability (quick adaptability to changes in the external environment), dynamism (speed of modernization) and innovation (the activity of the implementation and development of new information and communication technologies). The level of their compe-titiveness in both the national and global markets of educational services depends on the ability of higher education institutions to operate based on these principles.

The primary emphasis in the modernization of the Lithuanian higher education system is on the continual growth of the level of quality of the educational services, which became especially relevant with the accession to the Bologna Declaration. With this aim, a set of measures is implemented at the national and local (university) levels, in particular:

- the continuous improvement of licensing and accreditation mechanisms (two levels: of the higher education institution and specialities respectively);
- the careful control over the compliance with the license conditions for the provision of educational services;
- monitoring the compliance of higher education institutions with the established rules of the educational activities;
- the regular evaluation of the quality of higher education by foreign experts (namely – representatives of other countries of the European Union);
- the implementation of the internal monitoring of the quality of higher education – by the specially established in 1995 Center for Quality Assessment of

Higher Education (areas of activity: institutional evaluation; accreditation; evaluation of applications for establishing a higher education institution; initial evaluation of programs; consulting and information activities (Hoogenboom, 2015)).

The modernization processes in the higher education system of the Republic of Lithuania are focused primarily on ensuring high-level educational services, which includes the establishment of effective monitoring mechanisms. There are two levels of monitoring: the internal self-assessment and the external expert quality assessment. During the internal evaluation, the experts check the training programs of students according to the following vital blocks: the defined goals and expected results, the validity of the program structure, staffing and logistics, the evaluation of the program management (European Funding Guide, 2014; Motova, 2004).

The approach to the organization and implementation of an external assessment of the quality of higher education is thoroughly realized. The group of international experts is formed of representatives of other countries of the European Union – including employees of the ministries, universities (including rectors), and government (mostly – local authorities) (Hoogenboom, 2015). As a result, it is possible to increase the level of transparency and objectivity of monitoring significantly, to reduce the corruption risks, as well as to ensure the modernization of higher education institutions based on the implementation of the leading world experience.

The described above monitoring experience of Lithuania may be useful for Ukraine, as the quality of the educational services is one of the most painful prob-lems of the domestic higher education system. Moreover, corruption, over-bureaucratization and low dynamism of the Ukrainian higher education system cause a relatively low level of public confidence. The latter adversely affects the demand of students (including the foreign ones) for educational services of higher education institutions. Given this, the mechanisms of the internal and external evaluation developed at the Lithuanian universities by highly qualified experts from the countries of the European Union can help increase the transparency of the educational institutions. It, in turn, can be seen as a factor of increasing the attractiveness of the domestic university services at both the national and international levels.

The problem of the quality of educational services causes difficulties in the employment of graduates of higher educational institutions. There is a shortage of highly qualified specialists with the necessary professional competencies in the fields of information and communication technologies, transport and logistics, and medicine in the Lithuanian labour market (Deuten, 2009). The employers note the lack of critical thinking skills, problem-solving skills, teamwork skills (Deuten, 2009), which are identified by the World Economic Forum as one of the most promising and needed ones (Gray, 2016).

The imbalance of relations between higher education institutions and business entities, the exacerbation of the demographic problem, as well as the intensification of migration processes (academic mobility included), alongside with the growing internationalization of the scientific and educational space and increasing competition in the market of educational services, worsen the financial situation of the Lithuanian universities. These problems are also characteristic of the Ukrainian higher education system fostering the scientific search for the effective financial mechanisms and tools for diversifying the sources of the university funding.

Traditionally, the primary source of funding for higher education in Lithuania is the state budget. The inflationary processes and the reduction of the country's GDP cause a gradual reduction of funding from the state budget – in particular, by 20% in the period from 2008 to 2014. The same trend was observed in the UK, Ireland, Hungary and some other European Union countries (Šakalys, 1985; Sbruieva, 2015). The criteria for determining the amount of funding for the Lithuanian higher education institutions are the effectiveness of their research activities, the number of students, the success of the strategic development plans of the university.

In Lithuania, the mechanisms for accounting and reporting on the use of the invested resources (both public and private) have been developed. The unspent yearly funds are withdrawn from the state budget or must be carried over to the next year. The careful control is exercised over the funds of the business sector investment in the higher education institutions. The Lithuanian universities regularly report on the use of funds to the organizations that have allocated financial resources for training specialists (Godoń, Jucevičienė & Kodelja, 2004).

The analysis showed that the main revenues to the budgets of the Lithuanian universities are formed through educational activities. As a result of the reform of the educational sphere in 2009, the areas of specialization financed from the state budget were identified: the Humanities, social, biomedical, physical, and technical sciences, mathematics and art (European Funding Guide, 2014). Based on the competitive selection, the applicants can get the right to the budget-granted study; the rest of the applicants for higher education pay a commission in the amount of the cost of education (Table 2).

Table 2

Cost of education in Lithuania by industries and educational and qualification levels (2020), in euro

Direction	*Bachelor's studies*	*Master's studies*
Agricultural studies	2951	2952-4234
Economics and business studies	1600-2400	2608-3465
Art	2700-3000	2600-4234
Engineering science	2850-2951	4234
Humanities	2400-3075	3500-4234
Information and computer sciences	2850-2951	4234-42500
Law	-	2624-3000
Life and health sciences	1700-4200	3750-4500
Natural sciences	2850-2951	4234
Technological sciences	2951	4234
Social sciences	1668-3075	2608-3300
Physical sciences	2850-2951	4234

Table 3 shows the dynamics of the total cost of training one student in terms of the funding sources. The information presented in the table confirms the thesis mentioned above on the predominance of public funding in the higher education sector in Lithuania.

Under the conditions of the difficult socio-economic situation in the country, the excessive dependence of the higher education institutions on public funding can lead to additional financial risks for the Lithuanian universities. The urgency of diversifying financial sources in the Lithuanian higher education system is recognized at the national level – the country has the Agency for Science, Innovation and Technology (MITA). One of the key objectives of the Agency is to promote cooperation between the business entities and the scientific sphere bodies in the areas of the research results commercialization and the intellectual property rights protection (Konohrai, 2015).

Table 3

Total costs per student

	Total costs per student, in a thousand euros						
	2012	2013	2014	2015	2016	2017	2018
Total:	**4.6**	**4.6**	**5.1**	**5.4**	**4.3**	**4.7**	**5.6**
Budget funds	2.8	2.8	3.1	2.8	2.6	2.8	3.3
Funds of individuals and legal entities (residents and non-residents)	1.8	1.8	2.0	2.6	1.7	1.9	2.3

Source: [1]

In 2012, MITA launched the High Technology Development Program. Thanks to this Program, with the broad support of MITA from 2012 to 2016, 48 technology companies were established in Lithuania with the initiative and participation of scientists, including 32 – in the field of information and communication technologies, 7 – nanotechnologies, 5 – biotechnologies, 4 – mechatronics (Katus, Puur, Põldma & Sakkeus, 2007). This effectiveness brings several positive socio-economic effects: the creation of new jobs (a total of about 150), the implementation of competitive innovations (150), increasing inventive activity (15 patent applications) (Katus, Puur, Põldma & Sakkeus, 2007). The estimated amount of funding is 0.8 million euros (Agency for Science, Innovation and Technology) coming from the state budget. Moreover, the efficiency of the Agency's operation has laid a solid foundation for the diversification of the funding sources, in particular – attracting funds from foreign sources. From 2016 to 2020, it is announced about 10 million euros to be allocated from the Structural Funds of the European Union to support the implementation of the activities mentioned above (Katus, Puur, Põldma & Sakkeus, 2007).

The main emphasis in the development of commercialization should be placed on intensifying the cooperation of higher education institutions with business entities. In this aspect, since 2012, the Life Science Baltic Forum has been held regularly in Lithuania. The Forum allows reconciling the interests of the sectors of higher education and business-related science sectors as the elements of the four-link spiral Quadruple Helix. The event has gained international status, attracting more than 1,200 scientists and business representatives from 40 countries ("Lithuanian Higher Education", 2016; Science commercialization, 2016). The Forum allows the universities

and research institutions to inform entrepreneurs and get them interested in their inventions and developments. At the same time, the business entities are stepping up their investment activities, increasing investment in research and patenting, thus laying the groundwork for further innovative development.

The analysis of the effectiveness of stakeholders' interaction can be carried out on the basis of the basic provisions of the concept of Quadruple Helix (higher education – industry – government – civil society). This analysis allows us to note a significant imbalance in the interests of stakeholders, weak coordination of the universities, business, government and the public in Ukraine. The country's higher education institutions are in constant communication with the public sector, in particular the Ministry of Education and Science of Ukraine and its structural depart-ments. However, this communication is mainly regulatory by nature (ministerial orders, directives, recommendations for the universities and institutes). The feedback system needs to be thoroughly refined and improved. Certain steps in this direction are already being taken: mechanisms have been developed for submitting electronic requests for public information, conducting public discussions of the normative documents, and contacting the boards of rectors of higher education institutions in the regions of Ukraine.

Currently, the university-business cooperation remains underdeveloped. This has a negative impact on the parameters of the higher education institutions graduates' employment, youth unemployment in the country, the innovative activity of business entities, and the commercialization of the research results of the universities in the real sector of the national economy. At the same time, due to the lack of public funding, higher education institutions are making considerable efforts to diversify the funding sources. To deepen the long-term cooperation with the business sector, the universities organize business incubators, start-up centers, and integrate into regional innovation clusters. Among the promising areas of interaction between the universities and enterprises is the spread of the practice of dual education and the implementation of joint research and educational projects.

The interaction of higher education institutions with the public is developing slowly in Ukraine. The powerful universities are gradually becoming regional centers of intelligence and innovation, which increase their positive impact on the development of local communities. In particular, this is achieved through the implementation of social action projects, the provision of free counseling and expert support, as well as during public monitoring in the field of education.

At the local level, in order to support and develop the commercialization processes, the universities are establishing various specialized centres ("Lithuanian Higher Education", 2016). The existence of such centres is also justified by the fact that in the vast majority of cases, scientists do not have the skills necessary to market and sell their inventions, requiring the help of specialists in the field. Currently, there are examples of such centres reaching the state level – for example, the National Innovation and Entrepreneurship Center at Kaunas University of Technology. Thus, by combining and coordinating activities implemented at the international, national and local levels, the complexity of activities to promote the commercialization of the research results is ensured.

The systematic and coordinated actions of various economic entities have led to a state in which the research sector is one of the most dynamic in Lithuania (approximately 25% of annual growth), accounting for about 1% of GDP (comparable to similar figures in Germany, Japan, the UK, the United States, France, Sweden) ("Lithuanian Higher Education", 2016). In the medium term, the priority of the biotechnology research and development is determined with the strategic goal of taking a leading position in the European Union in this area until 2020 ("Lithuanian Higher Education", 2016).

Conclusions. The article deals with the analysis of the processes of the modernization of the Lithuanian higher education system, revealing several problems (financial, personnel-related, demographic, concerning the material and technical base, the activities quality and efficiency), relevant to the Ukrainian system as well. It justifies the value of the Lithuanian experience for Ukraine – with a view to its further adaptation and implementation in the domestic practice.

It is determined that the principal vector of the modernization of the higher education systems of the analyzed countries is to improve the educational services quality. Modernization processes require significant financial funding. Taking into account the Pan-European trend to reduce the higher education funding from the state budget, the need to diversify the sources of funding for the higher education institutions is justified.

In the information economy, there is a growing demand in the business sector for the research results (inventions, developments, innovations). The main measures to promote the commercialization of the research results in Lithuania are identified: at the national level (the Enterprise Ireland Commercialization Fund; the Lithuanian State Specialized Agency; the regular international Forum; the identification of the priority of developing the research sector as one of the national priorities; the support for the research initiatives) and at the university level (the system of the motivation of researchers to the inventing and patenting achievements, the opening of specialized centres for the commercialization of the research results, the support for the research teams). The fundamental principles of the realization of the specified actions are consistency, complexity, sequence and coherence of the elements of the four-link spiral Quadruple Helix (education – government – business – the public).

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