

State Support of Higher Education for Global Leadership in the 21st Century



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Abstract.

In today's world, innovation is not only a powerful driver of economic growth, but also an important prerequisite for competitiveness of enterprises and countries. And while in the traditional economic model they were more seen as independent forces, the role of state policy is aimed at encouraging innovation and supporting the generation of new knowledge, human capital development. Technology and entrepreneurship became more significant in the knowledge economy, innovation and global information networks. In addition to the formation of a

favourable business climate, important structural measures for the country's, its separate regions' and industries' innovative development include increasing measures for the country's innovation development, its separate regions and industries are increasing public expenditures for research and development, as well as investments in education.

Therefore, the purpose of this study is to summarize the international experience of state support to the field of higher education, as well as to identify the preconditions and prospects for the formation and implementation of state policy in the field of higher education focused on the technological and socio-economic development of Ukraine.

The article analyses the experience of the leading countries in relation to the state policy of promoting the competitive development of the higher education system. On the basis of the analysis of domestic and foreign publications, statistical data, analytical materials, international policy documents and systematic approach, the main directions which deserve attention when improving the state policy in the sphere of higher education in Ukraine are determined. The expediency and necessity of elaboration of a complex of incentive measures by the state to increase the international competitiveness of the higher education system of Ukraine, its greater integration into the European Higher Education Area and the European Research Area, strengthening of the innovative component of the domestic economy are substantiated.

Keywords: higher education institution, higher education system, competitiveness, university science, higher education funding.

Universities have always been the main producers and suppliers of knowledge in society, but today they are recognized as the main drivers of knowledge economy. In conditions of global competition, a diversified complex of interconnections among high-quality higher educations, scientific research (both in academic environment and beyond), and the innovations in all sectors of the economy, and the networks of cooperation between academic and non-academic institutions becomes increasingly more important for the provision of innovative and productive development of a state. Today, Ukraine needs to rethink its place in the global economic environment, urgently seeking and implementing the ways to accelerate innovative growth, aimed at raising prosperity level and improving the country's

position in global competitiveness ratings. Taking into account the crucial role of higher education in economic, technological, and social development of countries, higher education institutions should become key partners of Ukraine's government in achieving these goals, which includes the development of a comprehensive, targeted and favourable state policy in this area.

Over the last decade, against a background of liberalization processes, privatization and marketization in higher education systems in many countries, as well as an increasingly global nature of educational services' competition and growing role of universities in ensuring the competitive development of countries, the issue of public policy in higher education area, including state financing, has become very relevant and turned into the subject of numerous studies in different countries of the world. Many papers are devoted to the study of this issue, including those by Bogolub T.M., Boyko A.I., Ganzhela V.Y., Dzyuba S.G., Zaychenko V.V., Ilnitsky D.O.¹, Kalenyuk I.S.^{2,3}, Kovalenko D.I., Kuzmina N.G., Levchenko A.O., Levchenko O.M., Pavlyutkin I.V., Platonov Y.A., Plotnikova N.V., Radionova N., Savchenko I.G., Chumak O.V., Tsybmal L.I., Yurga V.A., Dougherty K.J., Doyle W.R., Jongbloed B., Kinne A., Reddy V., Ronca J.M., Tandberg D.A., Vossensteyn H., Weerts D.J., Zumeta W. and many others.

Despite the growing interest of the scientific community towards the study of certain models of state funding in higher education, the issues of wider state support for the purpose of the competitive development of the higher education system and the state as a whole remain insufficiently studied in Ukraine. The purpose of this article is to summarize the international experience of state support in the sphere of higher education, as well as to identify the preconditions and prospects for the formation and implementation of public-oriented public policy in higher education in Ukraine.

Today, public and private research universities of the world's leading countries play a key role in generating new knowledge *that builds* on innovation. Also, the global experience proves that higher education and innovation are important drivers of a country's competitiveness in the global economy. This is confirmed by the comparison of the positions of leading countries in *Global Competitiveness Index*, *Global Innovation Index*,

and Ranking of the National Higher Education Systems (fig. 1). In 2018, Ukraine ranked 83rd in the *Global Competitiveness Index*, 43rd in the *Global Innovation Index* (INSEAD, WIPO), and 38th in the *National Higher Education Systems Ranking* (Universitas21).

In order to facilitate the exchange of innovative and successful initiatives among countries and to identify policy decisions for maximizing the contribution of higher education to the achievement of national economic and social objectives, the Organization for Economic Cooperation and Development conducted a comprehensive international study on higher education policy⁴. It identifies eight key challenges in higher education, namely: governance, financing, quality assurance, equality, contribution to R&D and innovation, academic careers, labor market relations and internationalization. New imperatives of countries' development in such conditions are: ensuring high-quality training of specialists; supporting scientific research centers, which are globally competitive; improving the process of disseminating knowledge for the benefit of society.

In order to respond to the challenges of the new era, universities adapt their core functions while creating opportunities for entering the emerging markets with new types of educational services, research, as well as geographically new markets. At the same time, the universities in most European countries, in particular in Germany, France, Italy etc. are guided by the priorities for development indicated in a national research and innovation strategy (or program, the names of the documents vary from country to country). The purpose of such a program document is to ensure coordination between studies and other national policies, and target the country to achieve strategic goals at the national and European level, while facilitating the gradual integration between public and private research and education institutions.

In particular, the National Strategy for the Development of Higher Education in France sets out 5 strategic directions, namely, the construction of learning society and the support of domestic economy; development of European and international dimensions in the national higher education system; promotion of real public involvement and inclusiveness; invention of higher education of the 21st century; meeting the expectations and aspirations of youth⁵. For each

¹ Antonyuk L., Ilnitsky D., Barabas D., Sandul M. International competitive disposition of national higher education systems. *International economic policy*. 2017. #2 (27). pp. 7-32.

² Kalenyuk I.S. Napryamy transformaciyi mexanizmiiv finansuvannya osvity ... 2017...

³ Kalenyuk I.S., Tsybmal L.I. Osoblyvosti regulyuvannya rynku osvitnih poslug. 2011...

⁴ Santiago P., Tremblay K., Basri E., Arnal E. Tertiary Education for the Knowledge Society. Paris: OECD. 2008. URL: <http://www.oecd.org/education/skills-beyond-school/41266690.pdf>.

⁵ Stratégie nationale de l'enseignement supérieur — STRANES. Ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation. 2015...

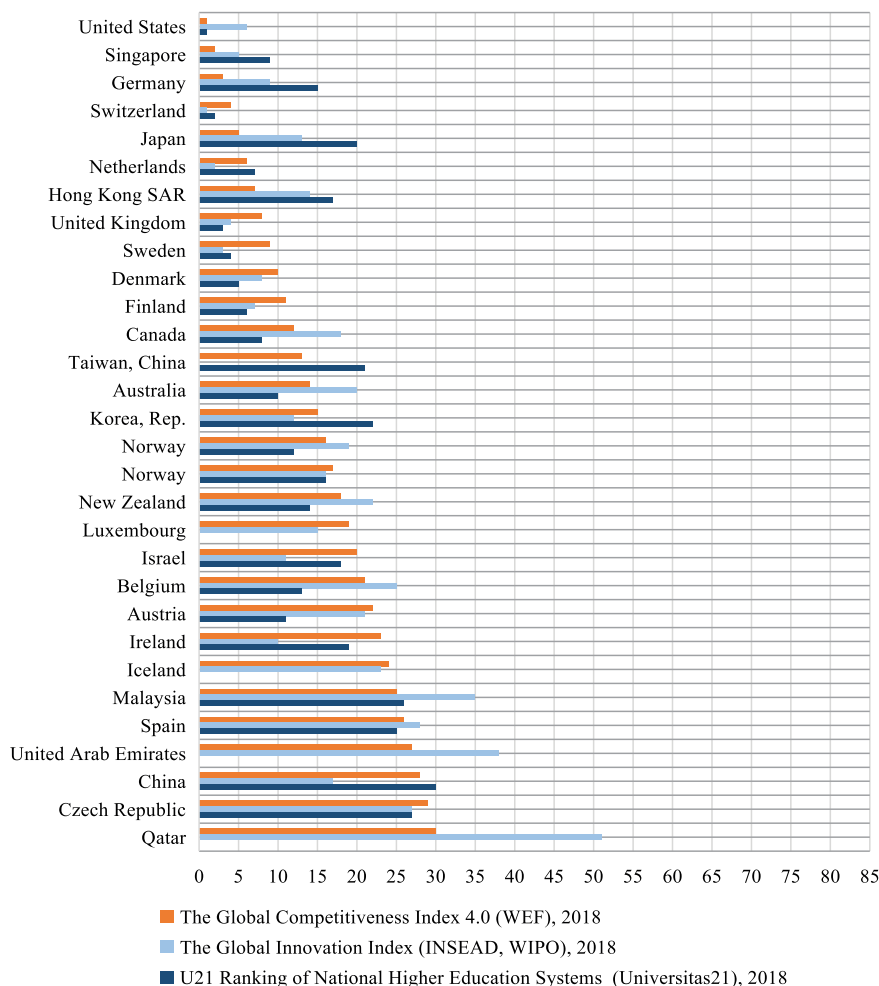


Figure 1. Top 30 countries in Global Competitiveness Index, Global Innovation Index and National Higher Education Systems Ranking (2018)

Source: compiled based on ^{1,2,3}

strategic direction in this strategy, specific practical proposals are identified. Thus, achieving the goal of “constructing a society that trains and supports the domestic economy” is foreseen by raising the level of skills of the population, developing mobile professional skills, innovation and creativity; preparing for new professions; increasing access and opportunities for obtaining multidisciplinary and interdisciplinary competences (digital, linguistic, design skills, etc.); improvement of

¹ The Global Competitiveness Report 2018. WEF. 2018. URL: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>.

² The Global Innovation Index 2018: Energizing the World with Innovation. Ithaca, Fontainebleau, Geneva: Cornell University, INSEAD, WIPO, 2018...

³ U21 Ranking of National Higher Education Systems 2018. University of Melbourne, Universitas 21, University of Birmingham, May 2018...

curricula for the future professions. There is a goal to implement the principle of “life-long learning”, so that 10% of the market for vocational training is taken by public higher education institutions or those accredited by the state.

According to the Strategy, the role of universities in France should grow and they should become centers for the establishment of public relations and “laboratories” of the future society. The Strategy is aimed at increasing the number of academics in the country (Ph.D., Doctors of Sciences) and improving their employment in the industry and public administration (by 2025, it is planned to educate 20,000 scholars annually). It is also planned to promote the expansion of real public involvement and stimulate inclusiveness; thus, by 2025, the gap between people of different social classes in higher education should

be halved: at present, only 28% of children from the families of workers receive higher education, compared with 65% of children from the families of engineers and managers.

Much attention in the National Strategy for the Development of Higher Education in France is devoted to scientific and educational components. Educational activity is regarded as a central component and priority of careers of faculty members and lecturers-researchers, which means that there is a requirement to pay same importance to both education and research. Also, in France, it is foreseen to create a special budget for transitional, reformation stage, and adaptation of economic model of the higher education system, ensuring coherence of funding in accordance with the goals set. It is planned to strengthen France’s role in the European Higher Education Area to this end. It is also important to create

DEVELOPMENT OF WORLD CLASS UNIVERSITIES

Table 1

SHARE OF PUBLIC FINANCING IN TOTAL EXPENDITURE ON HIGHER EDUCATION IN THE EU AND OECD COUNTRIES, % (2017)¹

Country	Share of public financing in total expenditure on higher education	Country	Share of public financing in total expenditure on higher education
Finland	97	Lithuania	75
Norway	96	Ireland	74
Luxembourg	96	Mexico	71
Austria	94	Netherlands	71
Iceland	92	OECD average	70
Sweden	89	Portugal	68
Greece	88	Spain	68
Slovenia	87	Russian Federation	65
Belgium	86	Italy	65
Germany	85	Hungary	63
Poland	84	Israel	58
Slovak Rep.	80	New Zealand	52
Czech Rep.	80	Canada	49
France	80	Australia	38
EU 23 average	78	Korea, Rep.	36
Latvia	77	USA	35
Estonia	76	Japan	32
Turkey	75	UK	29

incentives for enterprises to invest in higher education: in particular, the Strategy proposes to allocate 0.25% of the wage fund of enterprises to higher education, as well as to encourage industry of regions to support educational institutions of different levels.

While analysing the state role for competitive development of the higher education system, it should be noted that public funds are the main source of funding for higher education in OECD countries, although private funding for higher education is also significant. The share of public expenditure on average in OECD countries is up to 90% for primary, secondary, and vocational higher education, and 66% for higher education. Direct public spending on education institutions from primary to higher education in these countries is 4.2% of GDP on average, but there are significant differences between certain countries. In the Czech Republic, Greece, Hungary, Ireland, Italy, Japan, Lithuania, Luxembourg and the Russian Federation, direct public investment in education amounts to about 3% of GDP, and countries such as Finland, Norway and Costa Rica target around 6% of GDP as direct government expenditures for educational institutions². The share of public expenditure in total funding of higher education is

highest in Finland, Norway, Luxembourg, Austria, and the lowest among OECD countries — in the USA, Japan, and the United Kingdom (table 1).

Public spending on households for education at all levels (e.g., scholarships and student loans, etc.), and subsidies to other private educational organizations amount to, on average, 0.2% of GDP of OECD countries, and in Australia, Chile and New Zealand they make up more than 0.4% of GDP and even more in the UK — 0.6% of GDP³.

The annual Report of the Center for University Achievement Measurement, “The Best American Research Universities”, analyzes and provides statistical data on research performance in American higher education institutions. In this regard, it is interesting to note that the share of public expenditure on research funding in US universities ranges from 37.1 to 93.3% and remains relatively stable over the last years. In particular, Harvard and MIT spend around 50% of their budget on research, and mostly it is public funds received on a competitive basis. It should also be noted that in the United States, public research funding also covers non-direct costs, that is, 35-55% of direct costs, as opposed to, for example, Germany, where all indirect research costs are covered by universities themselves.

¹ Education at a Glance 2018: OECD Indicators. p. 260-262

² Education at a Glance 2018: OECD Indicators. p. 270

³ Education at a Glance 2018: OECD Indicators. p. 260-262

Historically, state support to science in the US has increased significantly since the Second World War; universities were seen as a strategic source of capacity building for the country's defense industry. Because of this, in the United States, the best higher education institutions began to receive funding for both applied and fundamental research, and turned into research universities¹. In comparison with another country model of fundamental and applied research, in which individual, highly specialized research institutes are being established in the country, and are financed both by state and private funds, the American model has proven its greater stability and success, having gained a stable leading position among national higher education systems in the world, and simultaneously its universities are leading in the country's national innovation system.

In the USA, government funding for research is distributed on a competitive and grant basis, playing a major role in stimulating research in universities and amounting to a quarter of all universities' revenues. Tuition fee that exists in virtually all higher education institutions is the main source of funding for American colleges and universities. However, in most cases, it is not the main source of funding: private universities account for 30-40% of the budget revenues, while in the state — less than a quarter². In the US, scholarships for students from public funds are provided either as support for outstanding achievements or because of low incomes of students' families. The state also guarantees student loans. Public universities (which are usually accountable to state governments, and not federal agencies) also receive direct public financing, which, according to average estimations, account for about 1/4 of all revenues^{3, 4}.

Another source of higher education funding (which also accounts for about a quarter of total funding) is a variety of charitable foundations, as well as business entities and individuals. The tradition of maintaining links between universities and graduates, which in turn often provides financial support, including scholarship funds,

plays a significant role. It should also be noted that most of the university campuses are built at the expense of sponsors, which are graduates or other people who support certain university departments or research areas. Also an important part of the American universities' income is the proceeds from sale of various products and services^{5, 6}.

It should be noted that the global economic crisis, which began in 2008, affected the level of public financing of education in virtually all countries. In 2009, there was a significant adjustment to state budgets, and in particular, a significant reduction in expenditures on educational institutions at all levels of education. However, already in 2010, public spending on educational institutions began to grow, albeit at a slower pace than GDP. Expenditures at different levels of education changed in different ways during 2010-2015: while around one third of countries increased investment in higher education at that time and it remained fairly stable respectively to GDP, costs for educational institutions at other education levels decreased (slightly more than by 6%). Bright examples of the countries that increased the share of GDP invested in higher education are Australia (21% growth) and the Slovak Republic (an increase of 74%), but during the period their investment in education institutions at lower educational levels decreased by at least 4 %⁷.

Transfer of public funds to private sector (through scholarships, loans for education, etc.) plays an important role in financing higher education, accounting for 5% of total amount of the funds for higher education in OECD countries. Australia, New Zealand and the United Kingdom are the countries with highest levels of public funds transfer to private individuals (from 20% to 35% of the total amount of funds allocated to higher education institutions).

On average, OECD countries account for 83% of total educational institutions funding — from primary education to higher education institutions — coming from public sources (from the state budget, budgets of state-territorial units within the country or from lower-level budgets). In Finland, Luxembourg, Norway and Sweden, the share of private funds allocated for education funding is up to 3%. On the contrary, private

¹ Research universities: international experience and Ukrainian perspectives: monography... p. 102

² Darmody B. (Moderator). National Research Council (US) Committee on Competing in the 21st Century... 2012 ...

³ Dahlman C. (Moderator). National Research Council (US) Committee on Comparative National Innovation Policies ... 2012 ...

⁴ KeshavanM. JLL Report: The top life science cluster is Boston. But second place goes to... North Carolina? Med-CityNews. 2015. URL: <https://medcitynews.com/2015/07/jll-report-the-top-life-science-cluster-is-boston-but-second-place-goes-to-north-carolina/>.

⁵ Romanovskij O.O. Derzhavna polityka USA i UK shhodo pidtrymky ... 2015 ...

⁶ Romanovskij O. Doslidnyczki pidpryyemnyczki US SHE ... 2012...

⁷ EUA Public Funding Observatory. Belgium: European University Association. 2017. URL: <https://eua.eu/resources/publications/718:eua-public-funding-observatory-2017.html>.

sources of funding account for about one third of all educational spending in Australia, Chile, Colombia, Korea, the United Kingdom and the United States. At the same time, international sources account for (averagely) 1% of the educational institutions' funding. In about 30% of OECD countries this number is above the average, and it is highest in the Czech Republic, Greece and Portugal (about 4%)¹.

Consequently, in most countries, the sources of funding allocated for covering costs of educational institutions are: government expenditures, funds from international institutions, private institutions, as well as students and their families. Much of government spending is directed to educational institutions, but governments also distribute funds to educational institutions through other mechanisms — by providing subsidies for education, or by direct state funding of institutions based on the number of students enrolled or credit hours; by subsidizing students, households and other private organizations (through scholarships, grants and loans that can be attributed to tuition fees received by educational institutions).

State support plays a particularly important role in the higher education systems of the new industrialized countries. The development of higher education in these countries is characterized by the presence of many common features, including active participation of the state, planning, use of best international experience, and focus on transforming the higher education system into a driver of innovation.

In particular, Singapore's higher education system, being founded on British education system's traditions, undergone significant transformations during the reign of Lee Kuan Yew, whose strategy was based on the desire to "develop Singapore's only natural resource — its people"². The decision to make the most of the past, and a comprehensive approach to reforming higher education allowed Singapore to build one of the most advanced and most competitive higher education systems in quite a short time (9th in Universitas21 ranking in 2018)³.

According to the World Economic Forum experts, the Singapore government is the most "future-ready", which is one of the fundamentals for maintaining competitiveness in times of the

4th Industrial Revolution⁴. The Singapore budget for 2018 provides USD 12.8 billion financing for the education system, about 40% of the funds to be received by higher education⁵. The higher education system of the country consists of five technical universities, three universities, a national pedagogical institute and a polytechnic institute, which provides postgraduate education. Since the 1970's, teaching is in English; the official languages of the country are Chinese, Malay and Tamil languages. The National University of Singapore (founded in 1905), a member of the International Alliance of Research Universities⁶, ranked 26th in the ranking of the world's top 100 universities in 2015–2016⁷. The well-known scientific institutions include Nanyang Technological University (founded in 1991, 55th in top 100 universities in 2016, and 11th in 2017), Singapore University of Management (founded in 2000), and polytechnics (Republican (2002), Singapore (1954), Temasek (1990), Ngee Ann (1963). In Singapore, there are also campuses of such leading world universities as Stanford, Chicago, MIT, Johns Hopkins University, the French INSEAD, etc., which actually makes Singapore an international higher education center, attracting the best students from all over the Asia.

The results in terms of increase in the potential and competitiveness of the Chinese higher education system over the past 20 years are outstanding⁸. In 2018, it ranked 30th among 50 countries in the National Higher Education Systems Ranking (Universitas21), and 43rd out of 119 countries in the Talent Competitiveness Ranking (in 2017 — 54th). Among educational programs, technical, mathematical, and scientific disciplines dominate. Over the past 15-20 years, international academic mobility and cooperation with foreign institutions has accelerated and received huge state support, which has led to a significant increase in higher education diversification in China, while at the same time, thanks to comprehensive state support the leading Chinese universities have substantially increased their scientific and educational capacity. The level of higher education enrolment, which

¹ Education at a Glance 2018: OECD Indicators. Paris: OECD Publishing. 2018. DOI: <http://dx.doi.org/10.1787/eag-2018-en>. p. 270.

² Syngapurska istoriya. Memuary Li Kuan Yu ... 2011 ...

³ U21 Ranking of National Higher Education Systems 2018. University of Melbourne, Universitas 21, University of Birmingham, May 2018. URL: https://universitas21.com/sites/default/files/2018-05/U21_Rankings%20Report_0418_FULL_LR%20%281%29.pdf

⁴ The Global Competitiveness Report 2018. WEF. 2018. URL: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>.

⁵ Tan A. Singapore Budget 2018: Spending needs to grow in healthcare, infrastructure, security and education. Business Times. 2018.

⁶ International Alliance of Research Universities: About. IARU. URL: <http://www.webcitation.org/69q0Utkub>

⁷ Top 100 world universities 2015/16 — THE rankings. URL: <https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking#!/page/0/length/25>.

⁸ Education in China: a Snapshot. OECD. 2016. URL: www.oecd.org/china/Education-in-China-a-snapshot.pdf. p. 11.

is considered to be extremely prestigious in the country (the competition reaches 200-300 people a seat), increased from 21% in 2006 up to 43% in 2016. Higher education in China is to be paid for, despite the fact that more than 60% of universities are public; however, the practice of targeted financing for higher education by enterprises' and organizations' lending, and part-time training combined with full-time job is widespread. In general, during the period of active reforms of the Chinese education system, public expenditure on the development of higher education and research has increased significantly, although financing is uneven over the years (on average, about 0.7% of GDP).

In China, in recent years, the number of world-class universities increased faster than in the rest of the world: from 13 in 2009 to 39 universities in 2018 in QS ranking¹. Further expansion of the Chinese universities' capacity is envisioned by the National Plan for medium and long-term prospects for education and development reforms (2010-2020). The best research universities in China are Beijing University, Tsinghua University, Fudan University, Shanghai Jiao Tong University, Zhejiang University, Harbin Institute of Technology, China Science and Technology University, and others. The accelerated development of universities and their transformation into leading world scientific, research and educational centers took place under conditions of significant state support, in particular within the framework of the "Project 211" initiatives (1995, aimed at achieving university leadership in the world by improving curricula in line with international standards and principles of interdisciplinarity, enhancement of research potential through the development of teaching staff and academic mobility, higher education infrastructure reforms and development of electronic and distance education), "Project 985" (1998, aimed at increasing financing of the best universities / faculties in order to strengthen their research productivity, etc.)². This created prerequisites for increasing disparities between leading universities and the rest of the higher education institutions of the country, but currently, in China there are also programs aimed at the development of regional universities, which provides prerequisites for reducing the gap in higher education quality in the West and East of China, and also satisfying regional needs in skilled

personnel. At the same time, leading Chinese universities are pursuing strategies to expand their presence in the global academic environment, attracting scholars and students from around the world, and opening their own campuses in other Asian countries.

The problems inherent in this stage of higher education system development in China relate primarily to higher education inadequate quality in different parts of the country, relatively small aggregate experience of reformers and administrative staff, lack of flexibility of managers, limited autonomy of universities and lecturers, and the very scale of this task. However, given the comprehensiveness of state reform efforts, high national motivation, GDP growth and, consequently, the growth in volumes of higher education and research funding, as well as improvement of academic culture and the practice of using the best world experience, there is no doubt that the Chinese higher education system competitiveness further growth will continue to strengthen its position among the key innovation countries, and will lead to an increase in the intellectual potential of the national economy and its transformation into a country with highly educated human resources.

The South Korean higher education system has undergone significant changes over the past 25 years. Thanks to consistent reforms and strong state support, the universities of the country have significantly increased their potential and have taken a worthy place among the best in the world (22nd place in the National Higher Education Systems Ranking in 2018). Since the 1990's and until now, the main goal of national government policy has been the qualitative changes in higher education. The higher education reform in South Korea was conducted in several stages. In 1995–1999, the main focus was on diversification and specialization of universities, creation of an autonomous and democratic scientific community, creativity and diversity of curricula. It was during the period that the financing of higher education was up to 5% of GDP. Also, the reform granted a state permit for the establishment of private higher education institutions. In 1999, the "Brain Korea 21" program, which stayed in force until 2012, was launched, with the main tasks being the creation of world-class universities, the introduction of an interdisciplinary approach to research, the increase of mobility options in terms of subjects, programs and educational institutions, as well as the wider use of the latest technological advances, and more flexible approach to teaching. Total funding of the program amounted to USD 3.2 billion. The main attention was paid to scientific and engineering research, which allocated 87.1%

¹ QS World University Rankings. QS. 2018. URL: <https://www.topuniversities.com/university-rankings/world-university-rankings/2018>

² Higher Education and Research in China. Federal Department of Foreign Affairs, Embassy of Switzerland in China, Science, Education, and Health section. 2014..

of funding (research in humanities and social sciences received only 4.2% of the total funds).

The universities — recipients of funds were required to implement significant organizational reforms in line with the global standards (it included, in particular, changes in enrolment procedures, academic standards, assessment systems, etc.). The government also paid considerable attention to the development of universities in the regions in order to reduce imbalances in skills over the country. Since 2008, the higher education system reform in South Korea was concentrated on the establishment of a more rigid system of hiring university lecturers, increasing the number of English-taught programs, granting the universities a greater autonomy in terms of choosing curricula, strengthening interconnections between industry and universities, strengthening government support for universities in relation to their internationalization activities. Also, during the period there was a certain revitalization of humanities in South Korea.

The contemporary higher education development program “Brain Korea 21 Plus” (2013-2019, total funding — USD 2 billion) is aimed at a qualitative leap in education and research potential of the country. At this stage, the state policy focuses on the development of world-class research universities, high-level experts, convergence of departments, enhancement of education and research quality. The results of the country’s higher education system consistent reform are quite impressive. Currently, 4 Korean universities are among the top 100 universities in the world according to the QS 2018 ranking (in 2015 there were 3 universities)¹. The most competitive Seoul National University ranked 36th, the Korean Advanced Scientific and Technological Institute (KAIST) ranked 41st (in 2015 — 51st).

A comparative analysis of research sector funding in different countries shows that the highest direct government R&D spending among OECD countries is in Luxembourg, Estonia, Poland, Hungary, Ireland, and the USA. And according to the indicator of total research expenditures among OECD countries, the leading ones are Israel (about 4.3% of GDP) and South Korea (4.2% of GDP), followed by Switzerland, Japan, Sweden, Austria, Denmark, Germany, Finland, and USA². According to the Battelle research institute experts, the higher education expenditures will continue to increase, and especially — in China

(fig. 2). The long-term forecast assumes that even although the commitment of the US and the EU countries to the latest research and development is not diminishing, the growth of Chinese economy will stimulate the level of research funding in this country and that will make China a leading country by the volumes of research funding from 2020s.

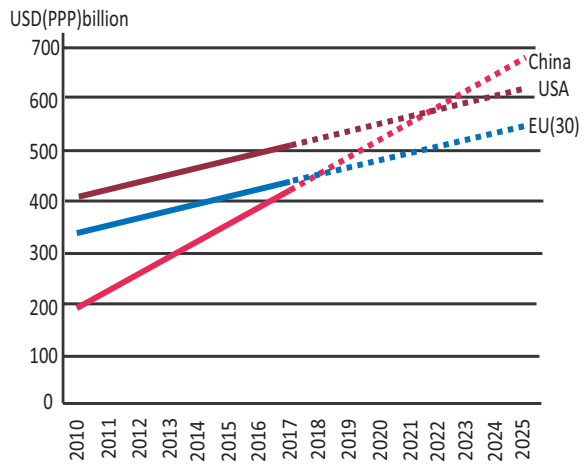


Figure 2. Research expenditures in USA, EU and China, 2010–2017 (2018–2025 — forecast)³.

In times of the 4th Industrial Revolution, state support for higher education and research remains one of the most important imperatives of a country’s innovation development, which is confirmed by the World Economic Forum experts⁴. According to their findings, “future-readiness” and flexibility of institutions, governments and individuals are of particular importance for successful economic development in contemporary conditions, along with the openness of the economy. At the same time, taking into account the principles of sustainability, achievement of the development goals and reduction of inequalities are impossible without proactive and far-reaching leadership. Higher education systems supported by governments can become key players in addressing the institutional weaknesses (in terms of security, property rights, social capital, finance, ethics and transparency, corporate governance, etc.), which significantly impedes the increase of living standards and incomes, as well as economic and social progress in many countries.

¹ QS Stars University Ratings. 2015. URL: <http://www.topuniversities.com/>

² Gross domestic spending on R&D. OECD. 2017. URL: <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>

³ 2015 Global R&D Funding Forecast, Battelle and R&D Magazine. 2014. URL: http://battelle.org/docs/default-document-library/2015_global_forecast.pdf

⁴ The Global Competitiveness Report 2018. WEF. 2018..

Conclusions

To ensure the competitive development of Ukraine in the XXI century, there is a need for a balanced and development-focused state policy in the field of higher education, research and innovation, which should provide for a specification of the country's development strategic priorities based on a thorough analysis, creation of favourable conditions for economic agents, coordination and stimulation of their outstanding achievements through a well-established and effective funding mechanism and other tools. At the same time, it is important to take into account the existing potential, national peculiarities, and the best world experience.

Taking into account the experience of many leading countries and the basic public higher education institutions funding, a mechanism for additional financing on a competitive basis should be developed and introduced. It must take into account the results of research and educational activities of institutions, as well as their development concept and missions. The winners of competitive selection for additional funding should be determined on the basis of independent national and international experts' recommendations, and not by the government. Additional funding programs should include the higher education institutions autonomy in selecting research areas and themes, strategic partners and resources for projects that will encourage universities to concentrate their efforts on scientific areas, in which they have competitive advantages, and to increase the effectiveness and efficiency of research through the personal interest of projects' performers in selected themes. At the same time, real financial autonomy should be ensured, which is connected with the right to independently and freely involve, dispose and use financial resources.

Important dimensions of state higher education support are: promotion of preservation, development of the higher education institutions resource base and social infrastructure, including provision of the targeted state preferential loans. The review and improvement of encouragement and motivation system of scientific, educational and innovative activities is required, as it should provide economic and social guarantees to scientific and pedagogical staff, increase in their social status and professional prestige. Favourable lending may also be provided for the purchase and construction of housing for scientific and pedagogical staff. Improving the material base, the quality of education, and creating a system of affordable loans for higher education will increase the competitiveness of domestic higher education

institutions among Ukrainian young professionals and attract foreign students.

Sufficient provision of priority-based budget funding to higher education and research, strategic investment in the development of research universities, and formation of a favourable legal environment for the implementation of their autonomous rights, limited by the legislation, will allow the universities to enhance their contribution into the acceleration of economic growth, productivity increase, improvement of development of personality and society as a whole, reduction of social inequality.

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