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TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS FOR 2012–2013 AND PROSPECTS FOR SCIENCE DEVELOPMENT IN ARMENIA



The paper covers Times Higher Education World Universities Rankings and the criteria, according to which these universities have been included therein. Most of them are located in North America and in Europe and represent the Anglo-Saxon school. In the list of top universities there have appeared more and more Asian universities of technical and natural science as a result of an increase in the number of research universities. The possibilities to establish a research university in Armenia, as well as the circumstances that can facilitate or impede the achievement of this goal have been considered. The megaprojects implemented in Armenia are presented and the role of research universities in promotion and establishment of these projects is described.

Key words: education, science, research university, ranking, Armenia, megaproject, and scientometrics.

Since 2010, *Times Higher Education Journal*¹ in association with *Thomson Reuters* information agency² has been rendering the list of world's best universities, *THE World University Rankings*³, which is one of the three world top rankings of the universities (*THE World University Rankings*, *QS World University Rankings*, and *Academic Ranking of World Universities*).

The methodology of rankings was elaborated jointly. The performance of universities is determined combining the data of statistical analysis, reports, and assessments of higher education institutions given by international academic experts and employers.

¹ <http://www.timeshighereducation.co.uk/>

² <http://thomsonreuters.com/>

³ <http://www.timeshighereducation.co.uk/world-university-rankings/>

The survey is conducted among the thousands of experts and employers from all over the world.

The expert criteria are the effectiveness of activities, the scientometric analysis of citations, the educational and academic practice in universities, the availability of, at least, 50 printed works, etc.

The experts have chosen 400 of 6000 universities providing the best quality of education. The annual rankings are made on the basis of score assigned to the universities on 100-point scale. The score is the sum of 5 main criteria.

These criteria are as follows:

1. Teaching and teaching environment (it includes several sub-criteria: professors-to-students ratio, academic space per student, comparative number of Ph.D. holders among the lecturers, lecturer-students relations, etc.) This constitutes 30% of total score given to the higher education institution.

2. Amount of researches, proceeds from research activities, ranking (it includes several sub-criteria:

total number of researches to academic staff ratio, proceeds from research commercialization, research quality, etc.). This constitutes 30% of total score given to the higher education institution.

3. Citations, research impact (the citation index of articles published by university staff⁴). This constitutes 30% of total point given to the higher education institution.

4. Innovations and proceeds from their industrial application (the number of university employees involved in innovational programs, the percentage of commercialized programs, and the readiness of industrial facilities to finance these programs). This constitutes 2.5 % of total score given to the higher education institution.

5. International cooperation (it includes several sub-criteria: the percentage of university staff involved in international programs, the possibility to admit under-graduate, post-graduate students, and professors from abroad, etc.) This constitutes 7.5 % of total score given to the higher education institution.

The analysis of 2012–2013 rankings have showed that the best universities are located mostly in the North America (128 universities) and in Europe (178 universities). Approximately half of them are representatives of the Anglo-Saxon school. Seven of Top Ten and forty-seven of Top 100 universities are American establishments. Fifty-seven Asian universities are listed among the best universities.

Interesting dynamics can be observed for the Asian universities. For example, for the recent 3 years their number has showed almost a twice increase, from 27 to 57. It has grown mostly at the expense of the North American and European universities.

Forty-six of the fifty best universities specializing in the humanities are representatives of the Anglo-Saxon school. Among the universities specializing in the natural science and technologies the Anglo-Saxon school yields its position as its representatives constitute only a half of the 50 best universities.

The analysis of rankings proves that the North American and European universities still have

been occupying the leading positions. They constitute the majority in the list of top 400 universities. Particularly, the representatives of Anglo-Saxon school stand out among them. The American and European universities provide the best education in the field of humanities and still have been unrivalled⁴.

This is an evidence of the high-level development and traditions of humanities there. However, in the field of natural science and technologies, the situation differs, as despite the fact that the European and American universities still have been maintaining the leading positions year by year they are yielding their positions to the Asian universities. The natural sciences and technologies are booming especially in the South-East Asian countries and this is a result of huge investments and reforms in the sphere of science.

The growing share of the Asian universities among the top higher education establishments is basically conditioned by an increase in the number of research universities.

There are 3 principal models of research universities: the American, the European, and the Asian ones. According to the American model the status of research university is based on public expertise, with the main criterion being the amount of funds for research activities received by means of competition.

In Europe, there is the League of the European Research Universities (*LERU*⁵). Most of the European research universities are the members of this league and are among the leaders of the European educational system.

In Asia, the research universities are established by virtue of administrative decisions. Unlike the European and American research universities, the Asian ones constitute a mighty educational system which was formed from the ground up.

The research universities should meet the following criteria:

1. Availability of scientific schools.
2. Efficiency of scientific researches.

⁴ http://en.wikipedia.org/wiki/Citation_index

⁵ <http://www.leru.org/index.php/public/home/>

3. Possibility to provide higher professional education.
4. Availability of modern scientific infrastructure and material and technical facilities.
5. Integration in the international programs
6. Possibility to carry out innovative activity.
7. Diversification of funding sources.
8. Possibility to form the culture of educational environment.

As regards the formation and sharp growth of the number of research universities, it should be mentioned that the research universities appeared as developing institutions which provided support to the science-consuming industry.

The research universities constitute the basis for science-consuming projects. For example, the biggest scientific and technological project of China, the Shanghai Synchrotron Radiation Facility (*SSRF*⁶), was initiated and built by the Shanghai Institute of Applied Physics (*SINAP*⁷).

The project cost is about USD 200 million and it is one of the best 4th generation accelerators in the world.

The Shanghai Institute of Applied Physics is considered to be one of the best research universities in China and is one of the biggest centers for studying nuclear physics and photons. Also, it is a leader of commercialization of scientific and technological innovations.

Armenia has chosen the way of implementing megaprojects. Currently, two big research and engineering projects are carried out in Armenia: the 3rd generation CANDLE synchrotron accelerator⁸ (the project cost is approximately USD 120 million) and the production of radionuclides at the Yerevan Institute of Physics (the project cost is USD 50 million).

The first project will foster the development of physics, chemistry, biology, medicine, nanotechnologies, and new-quality science-consuming industry.

It should be noted that in the Middle East and CIS countries, there are no accelerators with such technological capacity. Hence, Armenia will have an exclusive position in these regions. The first stage of CANDLE project (the construction of AREAL⁹ linear accelerator) has already been completed. The agreements on cooperation with Germany, Switzerland, France, Russia, Italy, and China have been signed. The equipment for AREAL worth USD 22 million was donated by the partners.

The second project will trigger the development of medical science, especially in the field of oncology. Armenia can become a regional center of diagnostics and therapy of oncological diseases. In order to ensure the implementation and effective operation of these two big projects, it is necessary to educate and train highly-qualified specialists, to establish institutions with specific scientific specialization, to be broadly involved in the international research and educational system, to create a technological cluster and an incubator of companies with the help of which the scientific innovations will be commercialized. These activities can be realized only by establishing a new research university.

The project of creation of research university in the Republic of Armenia takes special place in the strategy of science development in Armenia elaborated by the State Committee of Science of the Ministry of Education and Science of Armenia¹⁰. In 2015, it is planned to initiate the establishment of Technological Research University specializing in the natural sciences.

The scientific and educational environment in Armenia corresponds to some of the aforementioned criteria. There are traditional schools in the field of physics, biology, and chemistry. Among the CIS and Middle East countries, Armenia occupies the second place by scientific research efficiency falling behind Israel¹¹. The level of involvement in international programs is also high.

⁶ <http://ssrf.sinap.ac.cn/english/>

⁷ <http://english.sinap.cas.cn/>

⁸ <http://www.candle.am/>

⁹ <http://www.timeshighereducation.co.uk/>

¹⁰ <http://thomsonreuters.com/>

¹¹ <http://www.timeshighereducation.co.uk/world-university-rankings/>

The available scientific and educational infrastructures will also play a great supplementary role.

Among the impeding factors the following numerous problems in educational and scientific spheres can be mentioned:

- a. Problems related to the transitional period in the secondary education,
- b. Lack of correspondence of the educational programs to the present-day requirements,
- c. Corruption in the education system,
- d. Outdated material and technical base,
- e. Lack of interest of the private sector in commercialization of research products,
- f. Lack of funding of the scientific sphere.

To avoid many of these problems a green field university should be established, otherwise, being based on the existing one it will inherit all the main problems of its forerunner.

The educational process should be carried out within the framework of leading international educational programs and academic institutions in order to provide education-science coordination.

The academic staff should be employed out from the scientific and research community. It will provide science-education-science interrelations and will solve the current problems in the field of education.

The funds allocated for the research university should be distributed in a different way as compared with the traditional universities. At least, 35–40% should be allotted exclusively for the scientific and research activities (usually, 0–10% of the funds are directed to this sector in the Armenian universities).

The university should have a campus to help shape a specific culture environment similar to that existing in the international educational and scientific centers.

Also, there should be founded a technological cluster where the prospective innovative projects are commercialized. Despite all the problems, Armenia must follow the way of implementation of megaprojects and creation of research universities if it strives after competitive education, science, economy and, of course, the state in the 21st

century. Otherwise, it will remain a service providing and raw material exporting country which cannot be viable in long-term prospects. The experience of the countries with advanced and competitive science proves this statement.

Т. Арутюнян

ЛУЧШИЕ УНИВЕРСИТЕТЫ МИРА 2012–2013 гг.
ПО ВЕРСИИ ЖУРНАЛА TIMES HIGHER
EDUCATION И ПЕРСПЕКТИВЫ РАЗВИТИЯ
НАУКИ В АРМЕНИИ

В данной статье приведен список лучших университетов, представленный журналом *Times Higher Education*, а также рассматриваются критерии, по которым они выбираются. Большинство этих университетов находится в Северной Америке и Европе, значительная часть из них – представители англо-саксонской школы. В списке лучших университетов появляется все больше азиатских вузов, специализирующихся на технических и естественных науках, что является следствием увеличения числа исследовательских университетов. Рассмотрены возможность создания в Армении исследовательского университета, а также обстоятельства, которые могут этому способствовать или препятствовать. Рассматриваются мегапроекты и обосновывается роль исследовательских университетов в продвижении и становлении этих проектов в Армении.

Ключевые слова: образование, наука, исследовательский университет, рейтинг, Армения, мегапроект, наукометрия.

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КРАЩІ УНІВЕРСИТЕТИ СВІТУ 2012–2013 рр.
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У даній статті наведено список кращих університетів, представлений журналом *Times Higher Education*, а також розглядаються критерії, за якими вони вибираються. Більшість цих університетів знаходиться в Північній Америці і Європі, значна частина з них – представники англо-саксонської школи. У списку кращих університетів з'являється все більше азійських технічних і природничих вузів, що є наслідком збільшення числа дослідницьких університетів. Розглянуті можливість створення у Вірменії дослідницького університету, а також обставини, які можуть цьому сприяти або перешкоджати. Розглядаються мегапроекти й обґрунтовується роль дослідницьких університетів у просуванні й становленні цих проектів у Вірменії.

Ключові слова: освіта, наука, дослідницький університет, рейтинг, Вірменія, мегапроект, наукометрія.

Received 18.11.13