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

The article covers Times Higher Education World Universities Rankings and the criteria, according to which these universities are chosen. Most of them are in North America and Europe and represent Anglo-Saxon school, In the list of top universities appears more and more technical and natural science Asian universities as a result of increasing the number of research universities. The possibility of establishing a research university in Armenia, as well as circumstances that can promote or impede it are considered. The megaprojects implemented in Armenia are presented and the role of research universities in the promotion and establishment of these projects is substantiated.

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

Since 2010 *Times Higher Education* journal[1] in association with *Thomson Reuters* information agency[2] has been presenting the list of world's best universities - *THE World University Rankings*[3], which is one of the world's best 3 rankings of the universities (*THE World University Rankings, QS World University Rankings* ta *Academic Ranking of World Universities*).

Methodology of rankings was elaborated jointly. The performance of the universities is assessed by combination of the statistical analysis, reports and assessments of the higher education institutions given by international academic experts and employers.

The survey is conducted among the thousands of experts and employers from around the world. The criteria of the experts are the efficiency of the activity and scientomentric analysis of the citations, experience of the educational and academic activity in the universities, the availability of at least 50 printed works, etc.

The experts choose 400 of 6000 universities where the best education can be received.

In the annual rankings points given to the universities – up to 100. The point given to the university is a sum of 5 main criteria.

Those criteria are:

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

2. Amount of researches, profits obtained, ranking (it includes several sub-criteria: total researches number and academic staff number ration, sums obtained from the commercialization of the researches, quality of the researches, etc.). This constitutes 30 % of total points given to the higher education institution.

[1] http://www.timeshighereducation.co.uk/

[2] http://thomsonreuters.com/

[3] http://www.timeshighereducation.co.uk/world-university-rankings/

3. Citations, influence of the researches (the citation index of the articles published by the university staff[4]). This constitutes 30 % of a total point given to the higher education institution.

4. Innovations and industrial profits (how many employees of the university are involved in the innovational programs, what is the percentage of those programs that are commercialized, readiness of the industrial facilities to finance these programs). This constitutes 2.5 % of a total point given to the higher education institution.

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

The analysis of 2012—2013 rankings shows that the best universities are mostly in the North America (128 universities) and Europe (178 universities). Approximately half of them are the representatives of the Anglo-Saxon «school». 7 of Top Ten and 47 of Top 100 universities are American. 57 Asian universities were listed among the best universities.

Interesting dynamics can be observed concerning the involvement of the Asian universities. For example, for recent 3 years the number of the Asian universities has almost doubled – from 27 to 57. The number of the Asian universities has grown mostly at the expense of the North American and European universities.

46 of 50 best universities with orientation in humanities are the representatives of the Anglo-Saxon school. Among the universities specializing in the natural science and technologies the Anglo-Saxon school yields its position and constitutes only a half of 50 best universities.

The analysis of the rankings proves that the North American and European universities still occupy leading positions and constitute the majority in the list of top 400 universities. Particularly, the representatives of the Anglo-Saxon school stand out among them. The American and European universities provide best education in the field of humanities and they still are beyond competition. This is an evidence of high level of development and traditions of the humanities there.

The picture is not the same in the field of natural science and technologies. Though European and American universities occupy leading positions, nevertheless from year to year they yield their positions to the Asian universities. Natural sciences and technologies have especially been booming in the South-East Asian countries recently and this is a result of huge investments and reforms in the sphere of science.

The representative growth of the Asian universities has been mainly conditioned by the growth of the number of the research universities.

There are 3 main models of research universities — American, European and Asian.

In American model the status of the research university is settled at the basis of public expertise and the main criterion is the amount of the funds for the researches received by means of competition.

There is a League of the European Research Universities (*LERU*[5]). Most of the European research universities are the members of this league and leaders of the European educational system.

In Asia the research universities are formed on the basis of administrative decisions. Unlike 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 the scientific researches.

3. Possibility to provide higher professional education.

4. Availability of modern scientific infrastructure and material and technical facilities.

5. Some level of integration in the international programs

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

[5] http://www.leru.org/index.php/public/home/

6. Possibility to carry out innovative activity.

7. Some level of diversification of the funding sources.

8. Possibility to form culture of educational environment.

Turning to the history of formation and sharp growth of the number of the research universities, it should be mentioned that the research universities came forward as developing institutions which provide support and maintenance to the science-consuming industry.

The research universities form the basis of the science-consuming projects.

For example, the biggest scientific and technological project of China — Shanghai Synchrotron Radiation Facility (*SSRF*[6]) which was initiated and built by The Shanghai Institute of Applied Physics (*SINAP*[7]).

The cost of the project is about $200 million and it is one 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, photons, as well as commercialization of scientific and technological innovations.

Armenia has also chosen the way of implementing megaprojects.

Currently two big scientific and technological projects are carried out in Armenia — 3rd generation CANDLE synchrotron accelerator[8] (the cost of the project is approximately $120 million) and production of radionuclides at the Yerevan Physics Institute (cost — $50 million).

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

It should be mentioned that there are no accelerators with such technological capacity in the Middle East and CIS countries, thus Armenia will have an exclusive position in these regions.

The first stage of CANDLE project — building of AREAL[9] linear accelerator, has already been accomplished.

Agreements on cooperation with Germany, Switzerland, France, Russia, Italy and China were signed. The equipment for AREAL valued at $22 million was donated by the partners.

The second project will trigger development of medical science, especially in the field of oncology. Armenia can become the regional center for diagnosing and therapy of oncological diseases.

In order to provide implementation and efficient work of these two big projects, preparing of high quality specialist, establishment of the institutions with specific scientific specialization, broad involvement in the international scientific and educational system, creation of technopark and incubator of companies, with the help of which the scientific innovations will be commercialized, are required.

Such works can be implemented only by establishment of a new research university.

The project of creation of a research university in the Republic of Armenia takes special place in the strategy of the development of science in Armenia elaborated by the State Committee of Science of the Ministry of Education and Science of Armenia[10]. In 2015 it is planned to initiate the works on 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 fields of physics, biology and chemistry. According to the efficiency of the scientific researches Armenia occupies second place after Israel among the CIS and Middle East countries[11].

The level of involvement in the 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 great supplementary role.

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

a. Problems connected with the transitional period in the secondary education,

b. Lack of correspondence of the educational programs to the modern demands,

c. Corruption in the education system,

d. Outdated material and technical base,

e. Restricted interest of the private sector in commercialization of the scientific production,

f. Lack of funding of science.

To avoid many of these problems an absolutely new university should be established not on the basis of the existing universities because under such conditions only a newly established university will avoid inheriting 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 connection.

The academic staff should be picked out from the scientific community which will provide science-education-science connection and will rule out current problems in the field of education.

The funds allocated for the research university should be distributed in a different way from the traditional universities. At least 35—40% should be allotted exclusively for the scientific researches (in the Armenian universities 0—10% of the funds are devoted to the science).

The university should have a campus which will help to form a specific culture inherent in the international educational and scientific centers.

There should also be a technopark where the prospective innovatory projects will be commercialized.

Despite all the problems, Armenia must follow the way of implementation of megaprojects and creation of research universities if it wants to have competitive education, science, economy and, of course, state in the 21st century.

Otherwise we will be obliged to remain service providing and raw material exporting state which cannot be viable in long-term prospects.

The experience of the countries with developing and competitive science proves it.

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 технических и естественно-научных вузов, 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. ЗА ВЕРСІЄЮ ЖУРНАЛУ *TIMES HIGHER EDUCATION* І ПЕРСПЕКТИВИ РОЗВИТКУ НАУКИ У ВІРМЕНІЇ

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 й природничо-наукових 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.

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