

## APPENDIX 20 B: MEASURING NATIONAL SYSTEMS: U21 and QS (Parts 1, 2 and 3)

### APPENDIX 20 B: 1. U21 [National Rankings of Higher Education Systems.](#)

Includes metrics and sources for U21 and a Table 20 B.1 of the top ten universities by metric plus all Asian countries.

#### Expanded Metrics used by Universitas 21 2016

[http://www.universitas21.com/article/projects/details/158/overall-2016-ranking-scoresr -](http://www.universitas21.com/article/projects/details/158/overall-2016-ranking-scoresr-)

#### U 21 CATEGORIES – definitions and data sources

R - Research [expenditures] 20%

E – Environment – 20 %

C – Connectivity – 20%

O –Output – 40%

#### Research

R1: (5%) Government expenditure on tertiary education institutions as a percentage of GDP, 2012. (OECD Education at a Glance 2015 Table B2.3 & UNESCO Institute for Statistics [UIS] [www.uis.unesco.org](http://www.uis.unesco.org) )

R2: (5%) Total expenditure on tertiary education institutions as a percentage of GDP, 2012. (Same as R1)

R3: (5%) Annual expenditure per student (full-time equivalent) by tertiary education institutions in USD purchasing power parity, 2012. (OECD Education at a Glance, 2015 Table B1.1a; UNIESCO UIS, IMF data and statistics \*

R4: (2.5%) Expenditure in tertiary education institutions for research and development as a percentage of GDP, 2013. UNESCO, UIS, IMF, data and statistics

R5: (2.5%) Expenditure in tertiary education institutions for research and development per head of population at USD purchasing power parity, 2013. (Same as R4)

The countries with the largest total expenditure (public plus private) on higher education as a percentage of GDP are the United States, Chile, Saudi Arabia and Canada.

Resources per student, which includes research expenditure, are highest in Singapore, the United States, Switzerland and the United Kingdom. Denmark, Sweden and Switzerland continue to rank highest for research expenditure in tertiary institutions: for Denmark it is nearly one per cent of GDP, three times the average for all 50 countries.

#### Environment

E1: (1%) Proportion of female students in tertiary education, 2013. (UNIESCO UIS)

E2: (2%) Proportion of academic staff who are female in tertiary institutions, 2013. (Same as E2)

E3: (2%) A rating for data quality. For each quantitative series, the value is 2 if the data are available for the exact definition of the variable; 1 if some data are available which relate to the variable but some informed adjustment is required; and 0 otherwise.

E4: (10%) Qualitative measure of the policy environment comprising:

(4%) survey results for the policy and regulatory environment (see Appendix 2).

(4%) survey results for financial autonomy of public universities (see Appendix 2).

(2%) a measure of diversity of the system defined as

$= 1 * +$

E5: (5%) Responses to WEF survey question (7-point scale): “how well does the educational system in your country meet the needs of a competitive economy?” (World Economic Forum, Global Competitiveness Report 2015-2016; Table 5.03)

The top-ranked countries in the Environment module are the United States, Hong Kong SAR, Finland, New Zealand and the Netherlands,

## Connectivity

C1: (4%) Proportion of international students in tertiary education, 2013. OECD Education at a Glance 2014 TABLE c4:1 UNESCO

C2: (4%) Proportion of articles co-authored with international collaborators, 2013.

C3: (2%) Number of open access full text files on the web, per head of population, July 2015. (Webometrics July 2015, <http://www.webometrics.info/en> - latest displayed)

C4: (2%) External links that university web domains receive from third parties, per head of population, 2015. (Same as C4)

C5: (4%) Responses to question ‘Knowledge transfer is highly developed between companies and universities’, asked of business executives in the annual survey by IMD World Development Centre, Switzerland, 2015.

C6: (4%) Percentage of university research publications that are co-authored with industry researchers, 2011-13. (R Tijssen and R Yegros-Yegros, CWTS Leiden)

## Output

O1: (10%) Total articles produced by higher education institutions, 2013. (SCImago data, Scopus databank [www.scimagoir.com](http://www.scimagoir.com))

O2: (3%) Total articles produced by higher education institutions per head of population, 2013. (Same as O1)

O3: (5%) Average impact of articles as measured by citations in 2013 to articles published in previous years using the Karolinska Institute normalized impact factor. (Same as O1)

O4: (3%) The depth of world class universities in a country. This is calculated as a weighted average of the number of institutions listed in the top 500 according to the 2015 Shanghai Jiao Tong scores, divided by country population. (ARWU 2015 [www.shanghai ranking.com](http://www.shanghai ranking.com))

O5: (7%) The excellence of a nation’s best universities calculated by averaging the 2015 Shanghai Jiao Tong scores for the nation’s three best universities. (Same as O4)

O6: (3%) Enrolments in tertiary education as a percentage of the eligible population, defined as the five-year age group following on from secondary education, 2013. (UNESCO UIS)

O7: (3%) Percentage of the population aged 25–64 with a tertiary qualification, 2014. (OECD Education at a Glance 2015 Table A1.3a, ILOSTAT database [www.ilo.org](http://www.ilo.org))

O8: (3%) Number of researchers (full-time equivalent) in the nation per head of population, 2013.

O9: (3%) Unemployment rates among tertiary educated aged 25–64 years compared with unemployment rates for those with only upper secondary or post-secondary non-tertiary education, 2013.

(\*)- Additional information In Appendix 1 of [U21 Ranking of national higher education systems](#)

+ - see Appendix 2 Survey Components in

Table 20 B: 1: Top 10 Countries by metric plus all ranked Asia/Pacific countries

COMPOSITE		Resources	Environment	Connectivity	Output
United States	1	3	1	14	1
Switzerland	2	6	8	1	6
Denmark	3	1	31	2	4
United Kingdom	4	12	10	4	2
Sweden	5	5	23	7	5
Finland	6	7	3	9	9
Netherlands	7	11	5	6	8
<b>Singapore</b>	<b>8</b>	<b>2</b>	6	<b>8</b>	15
Canada	9	4	34	11	7
<b>Australia</b>	10	14	7	13	<b>3</b>
New Zealand	14	18	4	10	21
<b>Hong Kong</b>	14	16	<b>2</b>	12	23
Israel	18	20	32	20	10
Japan	20	23	17	24	16
Taiwan	21	25	13	22	22
Korea	23	21	44	28	18
Malaysia	27	13	14	34	43
Saudi Arabia	28	9	48	29	36
China	30	42	26	45	20
Thailand	44	47	21	36	48
Iran	47	41	45	50	39
Indonesia	50	50	29	32	50
ALSO in Top 10					
Belgium	11	15	9	5	13
Norway	12	10	11	16	12
Austria	13	8	24	3	19

APPENDIX 20.B: 2 QS [Higher Education System Strength Rankings \(May 2016\)](#)  
(HESS)

Includes metrics, critique of metrics and Table 20.B:2 Rankings of top 10 systems on each ranking plus all Asia/Pacific systems.

**QS' indicators using QS descriptions.**

**System strength** – Assessment of overall national system strength. Each country is awarded a score based on the number of its institutions which are ranked 700 or above in the QS World University Rankings®, divided by the average position of those institutions. The aim is to give an overall indication of each country's standing in the global ranking tables

**Access** - Places available to world-class higher education. Scores are calculated based on the number of places available at universities ranked within the QS global top 500, divided by an indicator of population size for that country. The calculation is the total number of full-time equivalent students at universities in the top 500 of the QS World University Rankings, divided by the square root of the population. The aim is to give an indication of the chances of gaining a place at a world-class university for residents of the country in question.

**Flagship institution** - Assesses the performance of the country's leading institution within the QS global rankings. This is a normalized score, based on the place each nation's top university occupies in the QS World University Rankings. This indicator is based on the premise that the performance of a country's leading institution is a credit to the overall system, often resulting from national investment in developing a flagship institution to lead the way.

**Economic context** - Assess the impact of national investment in higher education, by comparing each nation's financial situation to its performance in the international rankings. An indexed score is awarded for each university featured in the rankings (7 points for a university in the top 100, 6 points for 101-200, 5 points for 201-300, 4 for 301-400, 3 for 401-500, 2 for 501-600 and 1 for 601-700), and this is then factored against the GDP per capita for the country in question.

**Critique:** I generally do not editorialize. However, I cannot ignore the problems with each indicator and the lack of transparency and ability to recreate.

First, this is based only on QS data and even who is number one can change year on year. For Flagships, not only do they differ among rankers, for example number one in the US is Harvard, MIT or Cal Tech, but some differ within QS' World rankings and QS Asian Rankings.

There are multiple ways to measure GDP per capita, each with a different result. QS Does not supply which GDP it is using and its source.

**Table 20 B: 2: QS Higher Education System Strength for Top 10 by Metric and all Asia/Pacific Systems.**

		<b>SYSTEM</b>	<b>ACCESS</b>	<b>FLAGSHIP</b>	<b>ECONOMIC</b>
United States	1	1	1	1	1
United Kingdom	2	2	5	2	3
Germany	3	4	3	13	5
Australia	4	6	2	5	7
Canada	5	9	4	7	9
France	6	8	7	6	6
Netherlands	7	5	8	12	15
China	8	7	27	8	2
Korea	9	12	17	10	10
Japan	10	10	24	11	8
New Zealand	16	22	10	18	20
Taiwan	17	18	23	15	18
Hong Kong	20	15	20	9	34
Singapore	21	3	26	4	51
India	24	20	42	26	4
Malaysia	27	27	29	25	22
Israel	28	28	25	27	35
Saudi Arabia	36	31	34	34	43
Thailand	37	38	40	35	27
Kazakhstan	40	41	41	37	40
Indonesia	42	43	47	43	28
Lebanon	44	46	48	36	44
Philippines	46	49	45	47	32
UAE	48	39	44	48	50
Pakistan	50	53	NA	51	36

Other Top 10 systems: Access - Italy and Spain; Flagship - Switzerland

**REFERENCE:**

Yegros-Yegros, A. and Tijssen, R. (3-5 September 2014). University-Industry dual appointments: global trends and their role in the interaction with industry in E. Noyons, (Ed.), in Context Counts: Pathways to master big and little data. Paper presented at STI2014 Leiden University, Leiden (724-742) Universiteit Leiden - CWTS: Leiden