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The data show that power is moving eastwards, says Phil Baty, and the Asia University Rankings map this shifting R&D environment

Growth strategies

By Western standards, the scale and speed of Asia's development in higher education and research is staggering. Although the US remains the world's largest investor in research and development (\$429 billion (£255 billion) in 2011), its share of global spending is falling while that of the powerful Asian economies is rising.

Between 2001 and 2011, the US' share fell from 37 to 30 per cent, the European Union's dropped from 26 to 22 per cent, and Asia's (including China, India, Japan, Malaysia, Singapore, South Korea and Taiwan) increased from 25 to 34 per cent, according to the US National Science Foundation.

This is a shift in global power that the US has been quick to note. The NSF's 2014 Science and Engineering Indicators paint a frightening picture from the American perspective, using a palette of often jaw-dropping numbers.

On China, it reports: "The pace of growth over the past 10 years in China's overall R&D remains exceptionally high at about 18 per cent annually... propelling it to 14.5 per cent of the global total in 2011, up from 2.2 per cent in 2000."

China's figures speak for themselves: the country's share of refereed journal articles almost quadrupled from 3 to 11 per cent of the world total between 2001 and 2011; the number of first university degrees it conferred grew from 500,000 a year to 2.6 million (against the US' 1.7 million) over the same period; and in 2010, it accounted for almost a quarter of the world's 5.5 million science and engineering degrees (against the EU's 17 per cent and the US' 10 per cent).

Such extraordinary developments are not just restricted to China. In this supplement (page 21), Ashok Thakur, India's higher education secretary, describes how the country is poised to have the world's largest higher education system, even bigger than China's, after staggering growth in enrolments that currently sit at 27 million. And Sakarindr Bhumiratana, president of King Mongkut's University of Technology, Thonburi, explains how universities are at the heart of Thailand's strategy to boost its economy and escape the "middle-income trap" (page 24).

Right across the continent, Asian nations are pumping resources into their universities to meet exploding demand for education and to deliver economic growth.

This is why the *Times Higher Education Asia University Rankings* were created.

The overall *THE World University Rankings* are



firmly established as the most highly regarded global benchmark of university performance – trusted by governments, university leaders and academics, as well as by students and their families all over the world.

In recent years the global tables have shown Asia's rise, but they don't capture the full scale of its ambitions and progress. Such is the historical dominance of Western higher education that the WUR 2013-14 feature only 20 Asian institutions in the top 200 (the top 400 includes 61).

Many more leading institutions in the region aspire to reach the top and are making rapid progress. And this top 100, which covers Asia as a continent (so it includes Turkey and the Middle East, but excludes North Africa and Australasia), paints a richer, deeper picture.

The Asia table uses the same tried and trusted methodology as the overarching rankings – 13 separate performance indicators covering the full range of the university's key missions of teaching, research, knowledge transfer and international outlook. But it also makes public fresh data on a wider range and more diverse mix of top performers.

The *THE Asia University Rankings 2014* are a key part of our mission to provide as rich and as comprehensive a picture of global higher education as possible.

Phil Baty is editor, *Times Higher Education Rankings*.

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Sheer weight of numbers

Japan's position at the top is being challenged by neighbours near and far intent on promoting and investing in their universities. Phil Baty reports

China is mounting a serious challenge to Japan's traditional supremacy in Asian higher education, according to the *Times Higher Education Asia University Rankings 2014*.

Japan has held on to the top spot for another year at least, with 20 representatives in the table – including the number one institution, the University of Tokyo. However, it has lost two players compared with 2013, whereas mainland China has gained three, taking its total to 18 (the Chinese special administrative region of Hong Kong scores a further six).

In addition to these entrants, five mainland Chinese universities have gained ground, a performance matched by only two Japanese institutions.

"Japanese universities are not hungry enough," says Jamil Salmi, renowned education economist and author of *The Challenge of Establishing World Class Universities* (2007), who served as the World Bank's tertiary education coordinator from 2006 to 2012. "They are generally satisfied and comfortable with their present situation and have no sense of urgency. The top universities are doing very well, and the average ones are content with their results. But they do not seem to realise that competition has accelerated and become more dangerous, which explains why quite a few have fallen in the rankings."

"Other Asian countries, by contrast, such as China, Singapore – even the Saudis – are very driven and are working hard to improve their results."

But Japan retains its crown for now. UTokyo (as the institution now prefers to be known internationally) is still number one and Kyoto University remains in seventh place. The Tokyo Institute of Technology holds on to 13th position, while Osaka University moves up two places to 15th. But Japanese representatives that have taken a tumble include Keio (53rd to joint 72nd) and Kobe universities (73rd to 88th). And two more have fallen perilously close to the cut-off point: Okayama University (85th to 94th) and Chiba University (75th to joint 98th).

For Salmi, the country is hampered by structural weaknesses.

"It is a problem of governance," he argues. "With a leadership selection system still based on the democratic election of university presidents and deans, it is easier to be chosen on a platform of 'business as usual' than a programme of radical changes."

At UTokyo, at least, there is growing acknowledgement that Japan's historic dominance of the region in higher education terms can no longer be taken for granted. The key concern is a relative lack of funding.

Junichi Hamada, the university's president, tells *THE*: "With the financial ability (and the human resources) that Chinese universities have, they are a big threat to us. If we look towards the future, over the next 10 years, in specific areas perhaps they may overtake us. But it will still take time."

While China and other Asian

nations continue to invest heavily in their leading lights, Hamada describes the financial situation for Japanese institutions as "tight and difficult", adding that the constraints are "starting to have a negative impact" on research. Japan's national universities also offer uncompetitive salaries, making it harder for them to attract global talent, he adds.

In many ways, argues Hamada, UTokyo is punching above its weight, given its financial situation.

"My impression right now is that the fiscal reality of the university does not match our competitiveness worldwide," he says. "What we lack in terms of money, we are supplementing by our intellectual efforts."

UTokyo has the advantage of more than 100 years of history as Japan's best university, Hamada argues. This means it benefits from selecting the top students in the country and has "a very solid foundation", with good facilities and strong traditions of intellectual leadership, all of which help it remain a world-class player.

But Hamada knows that the institution cannot rely on history and reputation alone, and is alert to the threats and is responding to the challenges. For example, UTokyo is diversifying its income, seeking to increase the proportion of funding it derives from outside government.

It is also seeking to diversify its faculty by increasing the proportion of academic staff from outside Japan from the current figure of 6 per cent. This, he says, will "act as a stimulus".



Meanwhile, the Japanese government is pushing ahead with moves to give more executive power to university presidents, delivering more flexibility and freedom in governance.

Whether such moves will be enough to maintain Japan's supremacy remains to be seen, especially as China's powerful investment in building its research capacity appears to be paying off.

Although its top institution, Peking University, has slipped one place to fifth in the table, its Beijing neighbour, Tsinghua University, has held on to sixth and several others have made significant gains: the University of Science and Technology of China has risen four places to 21st; Renmin University of China has jumped from 41st to joint 32nd; Zhejiang University is up four places to 41st; and Wuhan University of Technology has moved from joint 58th to 49th.

The Chinese entrants in the top 100 are Tianjin University (62nd), East



China Normal University (joint 67th), Hunan University (81st) and Tongji University (87th).

This sterling performance is not surprising: in a recent article for *THE* ("Research: a global game", 15 May), Simon Marginson, professor of

international higher education at the Institute of Education, University of London, writes that China "continues to exhibit the world's most dramatic growth in research and development". R&D spending rose by 18 per cent per year in real terms in the decade after

2001 to \$208 billion (£123 billion).

As a result, the number of research papers the country publishes has increased by 15.6 per cent a year compared with a 3 per cent worldwide increase, Marginson adds.

China's strengths, he points out, are focused on areas of national concern: urban infrastructure; transport; communications; energy; engineering; physics; computer science; and chemistry. In the final discipline, it produced 17 per cent of all research papers in 2012, against the US' 16 per cent. In this context, the country's improved performance in the rankings is hardly surprising.

China's rise will be accelerated by another national concern: ever-closer integration with the Chinese special administrative region of Hong Kong. Hong Kong has had a head start in developing globally focused world-class universities in the region and boasts six institutions in the Asia rankings – all sitting comfort-

ably in the top 50.

Hong Kong's top three have held their ground this year: still in third place overall is the University of Hong Kong, followed by the Hong Kong University of Science and Technology (ninth) and the Chinese University of Hong Kong (12th). Meanwhile, Hong Kong Baptist University has risen eight places to joint 42nd.

Peter Mathieson, who this year took over as president of the University of Hong Kong, says that closer links with China are very much at the heart of his strategy for the institution.

"Our inherent strengths remain unchanged. Our core values are the pursuit of academic excellence, the protection of academic freedom and freedom of speech, and the commitment to contribute to the mission of making the world a better place," he says.

"Our continuing commitment is to excellence in everything we do: teaching, research, public engagement and leadership. Our dynamic, highly diver-

TOP 100 BY COUNTRY/REGION

Country	Number of top 100 Institutions	Top Institution	Top Institution rank
Japan	20	University of Tokyo	1
China	18	Peking University	5
South Korea	14	Seoul National University	4
Taiwan	13	National Taiwan University	14
India	10	Panjab University	=32
Hong Kong	6	University of Hong Kong	3
Turkey	5	Boğaziçi University	=19
Iran	3	Sharif University of Technology	37
Israel	3	Hebrew University of Jerusalem	18
Saudi Arabia	3	King Abdulaziz University	53
Singapore	2	National University of Singapore	2
Thailand	2	King Mongkut's University of Technology, Thonburi	=50
Lebanon	1	American University of Beirut	86



Global power Phil Baty (left), *THE* rankings editor, in discussion with Enge Wang, president of Peking University

sified culture and our reputation for being a place where individuals can flourish wherever they are from – all these elements remain as strong as ever.”

But he adds: “We must focus on our strengths; develop mutually beneficial strategic links with the best universities in the region and around the world; improve our relationships with industrial partners so that our research outputs can be translated efficiently; and achieve maximum impact.”

Capitalising on the institution’s growing links with China will be very important, Mathieson says.

“Universities all over the world crave closer links with China: the pace of economic development and the inevitability of the Chinese economy becoming the largest in the world mean that future planning for all developed nations must include relationships with the country.

“For Hong Kong, the door is already wide open and we must ensure that it can continue to enjoy this advantage as a gateway for higher education between China and the rest of the world.”

Beyond China, Mathieson believes that the general improvement in Asian higher education is good news for all the region’s leading institutions.

“I am heartened to see growing recognition of the rising success of universities in Asia; we welcome this and celebrate the fact that we are the region of the world where higher education is developing fastest.”

One outstanding regional performer is Singapore: although it has just two institutions in the top 100, the first, the National University of Singapore,

is in second place and the other, Nanyang Technological University, is 11th.

Both have been making rapid progress in the global rankings in recent years.

Tan Chorh Chuan, president of the National University, attributes his institution’s success to “a singular focus on continually enhancing the quality of its scholars, staff, students and leadership, and the impact of their work”.

This has required a bold strategic approach, he adds: “The university seeks to differentiate itself by pioneering innovations in education that we believe will be valuable in the future, fostering research clusters that enable high-impact multidisciplinary work on challenging global and Asian issues, and establishing deep strategic partnerships that represent distinctive new models and approaches.”

But Singapore’s political, cultural and economic climate has played a central part in creating the environment for success, Tan says.

Singapore’s institutions enjoy “institutional autonomy, coupled with the strong sustained support of the government and the public. This is aided by Singapore’s success as a dynamic, creative and forward-looking country that places an intensive emphasis on developing its local talent while being open and attractive to the best from around the world,” he says.

Another exemplar of Asian success in higher education and research is South Korea.

The country spent almost \$60 billion on R&D in 2011 – some 4 per cent of its gross domestic product. This commitment to research and education has supported its leading institutions

to make serious gains in the rankings. South Korea has 14 representatives in the 2014 Asia table, including three in the top 10.

Seoul National University is the biggest riser at the top of the table, moving from eighth in 2013 to fourth. Close behind is the Korea Advanced Institute of Science and Technology (rising two places to eighth). Pohang University of Science and Technology completes the top 10 trio, although it has lost ground since last year, falling five places to 10th.

Gains have also been made by Yonsei University (rising three places to 17th), Korea University (up from joint 28th to 23rd) and Hanyang University (which has jumped 15 places to joint 59th).

Taiwan also has a strong presence in the rankings, with 13 top 100 institutions. According to Huang Wen-Ling, director-general of its Higher Education Department, this performance similarly stems from recognition of “the crucial role the research university can play in a knowledge-based economy”.

A well-funded project launched in 2006, known as Aim for the Top, is pumping \$3.3 billion of public money into 12 Taiwanese universities over 10 years.

“With the funding, this group of universities is able to organise advanced research centres by recruiting world-class scholars and upgrading lab equipment to high-end levels,” she says. “These efforts have successfully turned Taiwanese research universities into innovation hubs, nationally and internationally.”

But as competition grows, Taiwan

has to run faster just to stand still. It has four fewer representatives in this year’s rankings compared with 2013 and a number of those remaining are slipping. Three are ranked in the 90s: Yuan Ze University (down 20 places to 91st); National Yang-Ming University (93rd from joint 89th); and Chung Yuan Christian University (which has fallen a massive 25 places to 97th).

To build on Aim for the Top when the funding runs out and to “ensure their position can be retained”, Huang says that Taiwan’s research universities are working to strengthen their links with industry.

“Such cross-board partnerships not only diversify the universities’ funding resources and turn them into self-sustained research entities, but the social and industrial impacts derived from scientific activities can also make the universities active contributors for the nation, even the whole world,” she adds.

But perhaps the brightest star of the 2014 Asia University Rankings is India. Last year it had just three institutions in the top 100, but thanks to dramatically improved engagement with data collection and analysis, the country now boasts 10 institutions in the table.

Panjab University (straight in at joint 32nd) leads the Indian charge (as it does in the overall *THE* World University Rankings). The country’s next six representatives are all prestigious Indian institutes of technology (led by IIT Kharagpur in 45th), followed by entrants Jadavpur University (joint 76th), Aligarh Muslim University (80th) and Jawaharlal Nehru University (90th).

Writing in this supplement, Ashok Thakur, India’s secretary for higher education, says that the long-running debate over whether or not India should go “full hog” and properly engage with global university rankings has now reached a positive “final resolution”.

“This has mercifully been laid to rest by none other than the president of India, Pranab Mukherjee, who has made it clear that as a matter of policy, all institutions in the country have to participate wholeheartedly in the rankings process.”

It is hoped that the collection and sharing of accurate global performance data will boost Indian universities’ quality and allow them to make a bigger splash on the global stage – as has been the case for other Asian nations.

Phil Baty is editor, *Times Higher Education* rankings.

NTU SINGAPORE

Asian university on a rapid rise globally

Singapore's Nanyang Technological University (NTU) is a young and research-intensive Asian university on a rapid rise globally. Helmed by Professor Bertil Andersson, winner of the Wilhelm Exner Medal, an honour bestowed on the world's best scientists, NTU is a melting pot of international award-winning scientists, young talents and eminent global partners such as BMW and Rolls-Royce. With its state-of-the-art facilities, NTU is building on its interdisciplinary strengths with cutting-edge research that improves lives and shapes the future. NTU now also offers medicine at a new school set up jointly with Imperial College London.



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TIMES HIGHER EDUCATION ASIA UNIVERSITY RANKINGS 2014: TOP 100

2014 Asia rank	2013 Asia rank	2013-14 World University Ranking's position	Institution	Country/region	Teaching	Research	Citations	Industry	International	Overall score
1	1	23	University of Tokyo	Japan	84.7	88.0	69.8	56.7	29.6	76.4
2	2	26	National University of Singapore	Singapore	68.0	77.8	66.4	64.3	94.3	72.4
3	3	43	University of Hong Kong	Hong Kong	61.6	69.9	61.5	56.9	80.3	65.3
4	8	44	Seoul National University	South Korea	76.4	79.2	47.3	86.0	29.4	65.2
5	4	45	Peking University	China	72.3	58.1	62.8	99.9	60.6	65.0
6	6	=50	Tsinghua University	China	66.8	65.9	59.9	99.9	42.6	63.5
7	7	=52	Kyoto University	Japan	69.5	69.5	58.2	78.7	27.5	63.2
8	10	56	Korea Advanced Institute of Science and Technology	South Korea	65.6	60.0	67.0	100.0	34.3	62.9
9	9	57	Hong Kong University of Science and Technology	Hong Kong	52.4	59.7	72.3	58.5	77.0	62.5
10	5	60	Pohang University of Science and Technology	South Korea	54.2	49.0	85.7	100.0	33.8	61.7
11	11	76	Nanyang Technological University	Singapore	37.7	54.3	67.5	100.0	91.0	57.2
12	12	=109	Chinese University of Hong Kong	Hong Kong	45.5	54.7	52.4	46.4	66.9	52.0
13	13	125	Tokyo Institute of Technology	Japan	52.4	51.4	52.0	67.5	32.1	50.8
14	14	142	National Taiwan University	Taiwan	47.1	58.3	47.8	47.1	27.3	49.2
15	17	=144	Osaka University	Japan	52.5	47.6	50.4	71.2	27.6	49.0
16	=15	=150	Tohoku University	Japan	51.8	48.1	47.3	85.9	29.3	48.5
17	20	190	Yonsei University	South Korea	44.5	47.0	44.2	70.1	35.0	45.1
18	=15	=191	Hebrew University of Jerusalem	Israel	42.8	37.0	54.3	33.3	52.9	45.0
=19	37	=199	Boğaziçi University	Turkey	20.5	22.8	88.2	45.9	49.8	44.3
=19	18	=199	Tel Aviv University	Israel	39.9	48.3	44.8	44.7	43.3	44.3
21	25	201-225	University of Science and Technology of China	China	38.7	26.1	69.6	69.4	25.8	44.0
22	19	201-225	City University of Hong Kong	Hong Kong	30.9	33.5	60.2	55.7	65.9	43.7
23	=28	201-225	Korea University	South Korea	46.2	42.2	41.1	70.3	35.5	43.3
24	38	201-225	Istanbul Technical University	Turkey	26.2	19.2	82.3	68.2	35.7	42.7
25	24	201-225	Fudan University	China	41.6	31.9	54.1	46.7	37.9	42.3
26	21	201-225	Technion Israel Institute of Technology	Israel	35.1	37.2	48.9	36.2	59.7	41.7
=27	23	201-225	Sungkyunkwan University (SKKU)	South Korea	37.6	38.8	45.8	98.6	33.7	41.6
=27	36	201-225	Tokyo Metropolitan University	Japan	19.3	9.6	100.0	31.0	29.4	41.6
=29	22	201-225	Middle East Technical University	Turkey	39.2	30.0	56.4	57.0	31.2	41.5
=29	26	201-225	Nagoya University	Japan	37.4	32.1	55.1	80.6	28.0	41.5
31	=28	226-250	Bilkent University	Turkey	24.4	26.0	69.2	46.6	43.7	40.3
=32	-	226-250	Panjab University	India	25.8	14.0	84.7	28.4	29.3	40.2
=32	41	226-250	Renmin University of China	China	35.5	13.4	69.6	40.4	48.4	40.2
34	32	251-275	National Chiao Tung University	Taiwan	37.3	42.1	37.3	99.5	28.9	39.6
35	=33	251-275	Hong Kong Polytechnic University	Hong Kong	28.4	35.7	48.4	40.3	62.6	39.5
36	35	251-275	Nanjing University	China	36.8	23.2	52.6	51.8	50.8	38.9
37	=42	251-275	Sharif University of Technology	Iran	29.7	37.2	49.0	98.3	20.7	38.8
38	27	251-275	National Tsing Hua University	Taiwan	39.5	35.4	44.7	43.4	21.5	38.6
39	39	276-300	Tokyo Medical and Dental University	Japan	43.3	21.1	52.0	46.6	22.0	37.7
40	31	276-300	Koç University	Turkey	16.6	17.1	72.1	41.1	57.8	37.1
41	45	301-350	Zhejiang University	China	35.9	32.1	36.5	94.5	21.0	35.3
=42	50	301-350	Hong Kong Baptist University	Hong Kong	20.7	13.9	65.3	30.2	59.5	35.2
=42	=42	301-350	University of Tsukuba	Japan	36.6	20.9	48.9	35.3	32.6	35.2
44	47	301-350	National Cheng Kung University	Taiwan	31.5	40.7	27.6	100.0	24.9	34.3
45	30	351-400	Indian Institute of Technology, Kharagpur	India	39.3	30.0	35.3	57.0	14.7	33.9
46	46	301-350	National Sun Yat-Sen University	Taiwan	27.3	32.6	43.2	45.0	22.1	33.7
47	40	301-350	Shanghai Jiao Tong University	China	35.7	31.8	32.3	79.2	22.8	33.6
48	44	301-350	Hokkaido University	Japan	41.0	28.3	32.3	44.2	24.6	33.4
49	=58	301-350	Wuhan University of Technology	China	14.8	7.8	78.1	58.7	18.9	33.1
=50	55	301-350	King Mongkut's University of Technology, Thonburi	Thailand	13.0	10.5	75.4	62.2	24.4	33.0
=50	48	301-350	Kyushu University	Japan	38.6	28.0	30.9	75.0	24.5	33.0
52	52	351-400	National Taiwan University of Science and Technology	Taiwan	25.5	40.4	33.0	47.9	21.6	32.5

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- **“With an annual spending per student, POSTECH compares favorably with Ivy League universities in the U.S”**
 - “The Road to Academic Excellence” World Bank, 2011

When POSTECH first opened its doors in 1986, in Pohang, Korea, POSTECH defied the odds by blazing new trails that had not been attempted by other universities in Asia. POSTECH continues to strive to make the impossible possible, exploring uncharted territories in higher education and research.

TIMES HIGHER EDUCATION ASIA UNIVERSITY RANKINGS 2014: TOP 100

2014 Asia rank	2013 Asia rank	2013-14 World University Rankings position	Institution	Country/region	Teaching	Research	Citations	Industry	International	Overall score
53	49	351-400	King Abdulaziz University	Saudi Arabia	18.2	9.4	58.2	39.7	74.3	32.3
54	54	351-400	National Central University	Taiwan	22.6	22.1	46.2	83.9	34.5	32.0
55	-	351-400	Indian Institute of Technology, Kanpur	India	31.3	25.2	41.8	42.4	17.3	31.9
56	51	351-400	Sun Yat-sen University	China	29.4	18.2	48.1	43.4	25.5	31.7
57	=69	351-400	China Medical University, Taiwan	Taiwan	18.9	28.1	46.2	60.8	20.5	31.0
58	77	351-400	King Saud University	Saudi Arabia	21.4	21.1	32.3	93.9	72.2	30.2
=59	74	351-400	Hanyang University	South Korea	30.4	27.7	26.9	55.3	42.9	30.1
=59	-	351-400	Indian Institute of Technology, Delhi	India	33.8	23.0	38.5	-	15.3	30.1
=59	56	351-400	Indian Institute of Technology, Roorkee	India	25.1	12.3	53.6	64.8	15.6	30.1
62	-	-	Tianjin University	China	21.8	26.4	39.3	98.5	15.9	29.9
63	60	-	Juntendo University	Japan	32.5	12.1	45.8	55.7	17.0	29.8
=64	64	-	Kyung Hee University	South Korea	28.5	27.6	24.4	86.4	40.9	29.4
=64	57	-	Waseda University	Japan	23.8	16.2	45.8	31.0	37.9	29.4
=64	=58	-	Wuhan University	China	29.8	14.3	40.7	73.0	28.7	29.4
=67	-	-	East China Normal University	China	24.6	13.6	46.6	39.8	27.1	28.5
=67	=62	-	King Fahd University of Petroleum and Minerals	Saudi Arabia	23.2	16.0	30.9	50.9	82.9	28.5
69	66	-	Harbin Institute of Technology	China	28.9	18.2	33.7	93.8	24.7	28.4
70	68	-	National Taiwan Normal University	Taiwan	26.0	30.9	25.1	66.5	25.7	28.2
71	=69	-	Osaka City University	Japan	26.0	16.6	42.7	42.0	19.8	28.1
=72	53	-	Keio University	Japan	24.0	20.6	39.6	42.4	23.0	28.0
=72	-	-	University of Seoul	South Korea	18.2	18.0	47.3	29.1	29.1	28.0
=74	67	-	Hiroshima University	Japan	29.8	15.7	38.1	42.1	23.5	27.9
=74	-	-	Indian Institute of Technology, Guwahati	India	22.1	11.6	53.6	-	17.5	27.9
=76	-	-	Ewha Womans University	South Korea	22.0	15.1	44.2	35.2	31.7	27.6
=76	-	-	Indian Institute of Technology, Madras	India	30.6	18.6	32.2	73.3	17.4	27.6
=76	-	-	Jadavpur University	India	29.5	14.9	41.8	28.2	14.4	27.6
79	80	-	Dalian University of Technology	China	21.8	17.9	39.3	86.6	21.4	27.5
80	-	-	Aligarh Muslim University	India	38.5	11.3	33.8	28.2	19.0	27.2
81	-	-	Hunan University	China	15.0	10.9	55.5	43.6	16.5	26.8
82	61	-	Mahidol University	Thailand	28.6	14.3	32.3	38.5	42.0	26.7
=83	-	-	Asia University, Taiwan	Taiwan	9.9	15.4	55.4	34.0	20.7	26.6
=83	=62	-	Tehran University of Medical Sciences	Iran	46.5	20.3	15.8	29.1	14.5	26.6
85	95	-	Isfahan University of Technology	Iran	20.3	16.7	41.0	56.5	18.4	26.2
86	=87	-	American University of Beirut	Lebanon	23.3	13.3	28.2	29.9	74.3	25.8
87	-	-	Tongji University	China	26.5	18.3	23.6	74.9	44.4	25.7
88	73	-	Kobe University	Japan	27.9	13.6	35.2	38.8	21.8	25.6
89	84	-	Kyungpook National University	South Korea	19.9	16.7	38.1	40.7	27.3	25.5
90	-	-	Jawaharlal Nehru University	India	39.4	12.3	26.4	-	19.0	25.3
91	71	-	Yuan Ze University	Taiwan	13.4	15.6	47.8	33.4	18.1	25.2
92	78	-	Sogang University	South Korea	25.3	31.9	13.1	64.5	29.9	24.9
93	=89	-	National Yang-Ming University	Taiwan	30.3	20.1	25.1	31.5	18.2	24.8
94	85	-	Okayama University	Japan	22.2	12.5	36.7	48.3	25.6	24.5
95	=89	-	Xi'an Jiaotong University	China	25.3	21.0	22.4	64.2	25.8	24.2
96	=96	-	Kanazawa University	Japan	24.2	13.6	35.2	30.5	19.1	24.1
97	72	-	Chung Yuan Christian University	Taiwan	13.6	28.1	28.9	56.6	18.7	24.0
=98	75	-	Chiba University	Japan	24.2	16.3	29.6	48.2	22.0	23.9
=98	79	-	Pusan National University	South Korea	24.9	23.2	19.8	59.0	26.8	23.9
100	94	-	Chung-Ang University	South Korea	29.4	27.7	8.7	47.7	36.7	23.7

Explore the tables in detail and personalise the results on our official interactive rankings website:
www.timeshighereducation.co.uk/wur



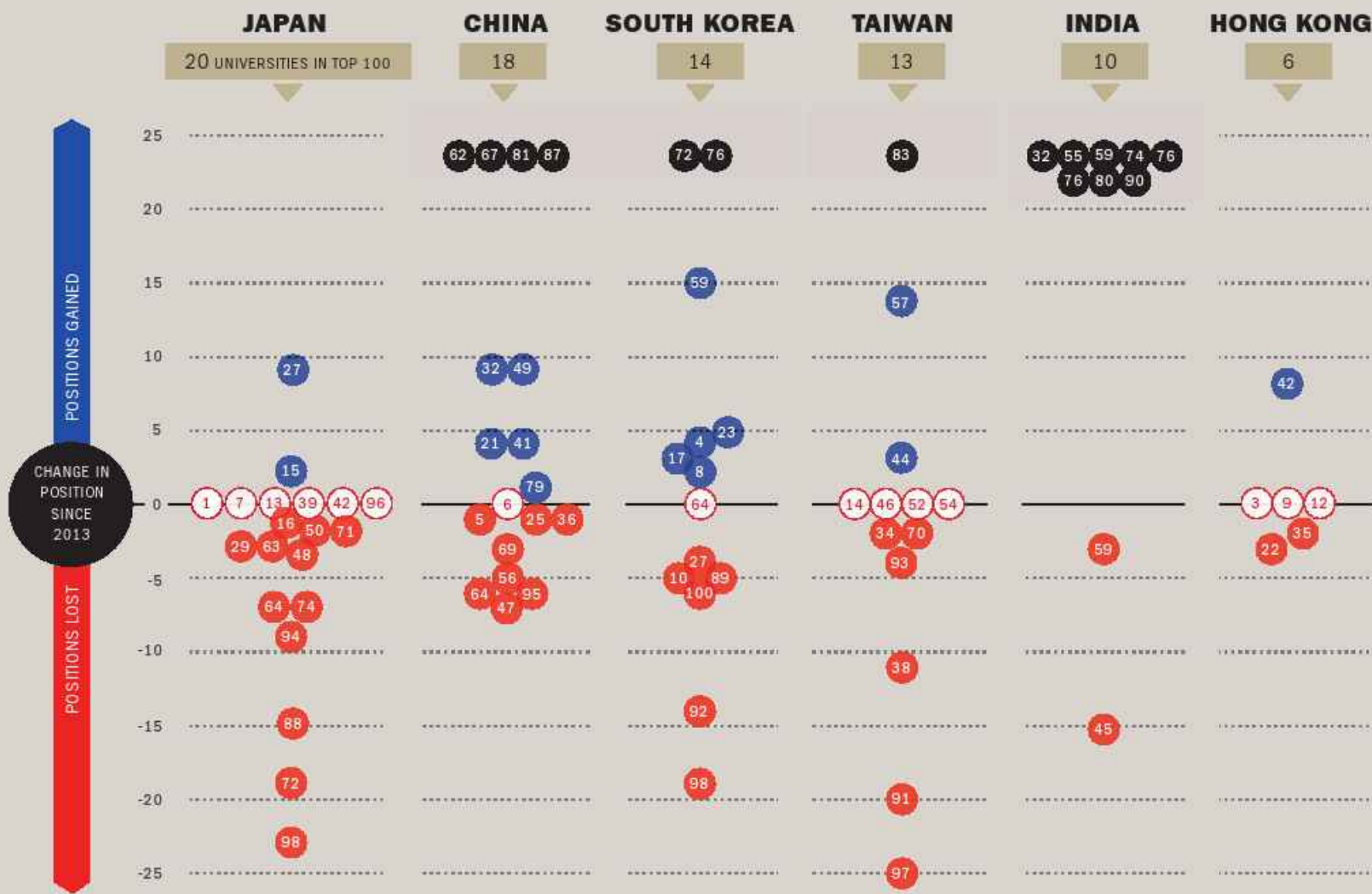
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Highs, lows and the status quo

The 2014 Asia University Rankings show nations jockeying for position in a highly competitive environment. Here's a snapshot of the runners and riders



Japan may be the top Asian nation for higher education and research, but it is "not hungry enough" to sustain that position, argues education economist Jamil Salmi. He expects rising Asian competitors such as China to soon catch it up and surpass it. Japan's institutions must guard against complacency to stay on top.

With four top 100 entrants and five institutions climbing the rankings, **China** seems poised to capture Japan's crown. The country's commitment to research spending and reforms to nurture world-class universities appear to be paying off.

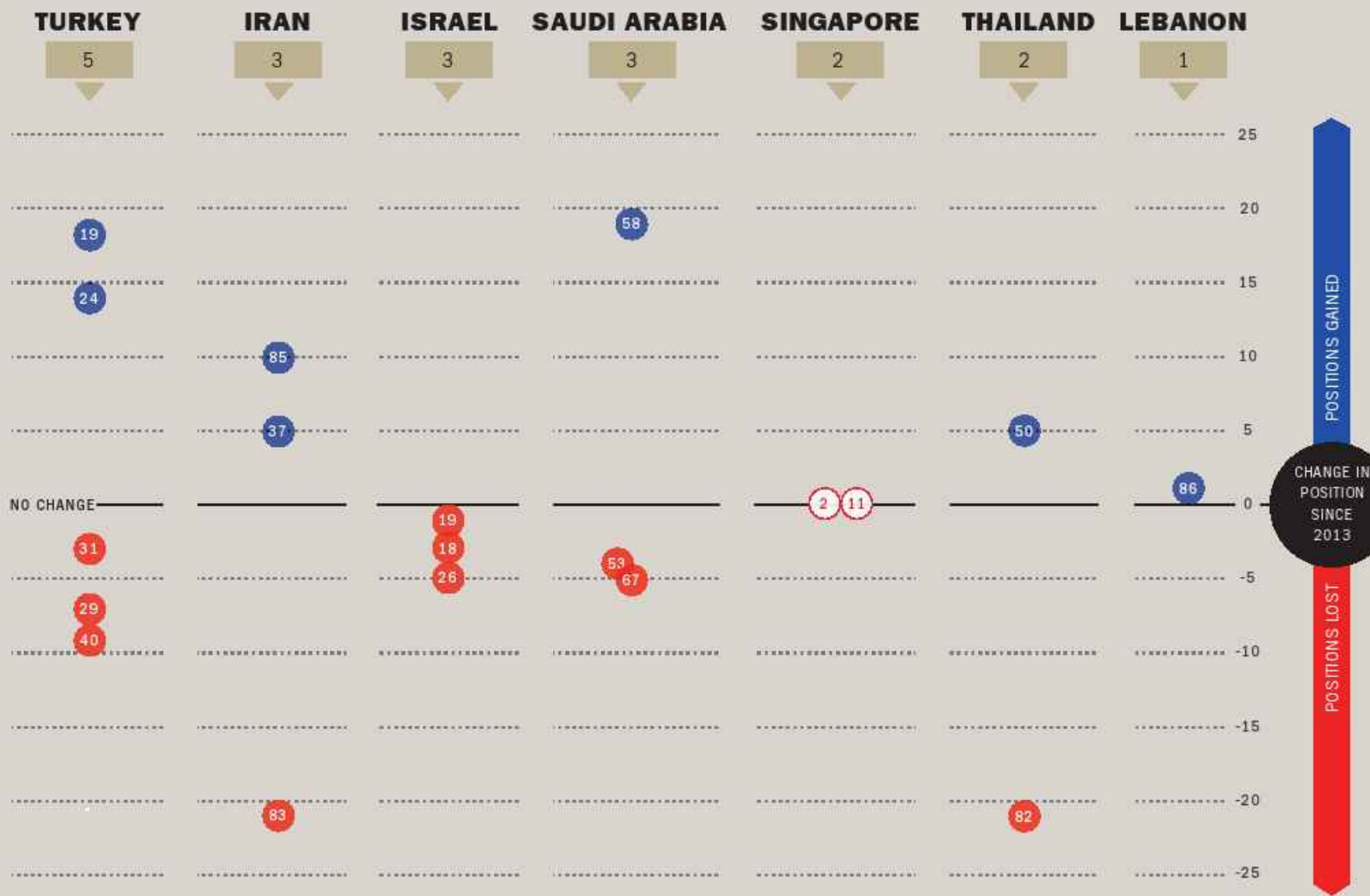
South Korea is a rising star of both the global and Asia rankings. Perhaps we shouldn't be surprised by its progress: after all, it is one of the world's biggest spenders on education and research.

Taiwan is investing heavily – \$3.3 billion (£2 billion) over 10 years from 2006 – in its leading universities under the Aim for the Top programme. But mounting competition from its neighbours has pushed some of Taiwan's players out of the top 100 (it had 17 universities in the 2013 tables) and others remain perilously close to the precipice.

India's increased engagement with the international agenda generally and global rankings in particular has helped to dramatically improve its showing in the top 100 (in 2013 it managed only three representatives). And the country's drive to introduce systematic quality assurance and accreditation for its huge range of higher education institutions should further enhance its performance.

Hong Kong shines on as an Asian star, with all six of its ranked institutions comfortably making the top 50. Its three highest-ranked universities have held firm in the face of growing regional competition.

- POSITIVE CHANGE SINCE 2013
- NOT PREVIOUSLY RANKED
- NEGATIVE CHANGE SINCE 2013
- 19 NUMBER INDICATES POSITION IN ASIA UNIVERSITY RANKINGS 2014



Turkey is a nation bursting with potential: it is one of the up-and-coming "MINT" nations identified by economist Jim O'Neill as an exciting economic prospect with a young population. The 2014 Asia rankings bear out such optimism: its top two institutions have gained significant ground.

Iran's research output is expanding rapidly, despite economic sanctions: Thomson Reuters has found that the country's share of the world's research papers grew from less than 0.2 per cent in 2000 to 1.3 per cent in 2009. It is strong in the physical sciences, particularly maths, where 1.7 per cent of its publications are among the world's most highly cited papers.

Israel's three top 100 institutions sit comfortably in the top 30, but all have lost ground as competition in the region mounts. The country must act swiftly to arrest its decline.

Saudi Arabia has three top 100 institutions (one of which has gained significant ground); this is particularly impressive given that arguably its most exciting research institution, the King Abdullah University of Science and Technology (which has a \$20 billion endowment), has not yet shown up in the rankings.

Singapore may have only two universities in the list, but both are big hitters and rising stars in the global rankings. The National University of Singapore is challenging the University of Tokyo for Asia's number one spot, but has been held in second place for another year, at least.

Thailand's two representatives in the list displayed mixed fortunes. King Mongkut's University of Technology, Thonburi makes the top 50, but Mahidol University has lost a great deal of ground.

Lebanon's sole representative, the American University of Beirut, has crept up a single position.

National Taiwan University of Science and Technology

Scholarship

- (1) NTUST Scholarship
- (2) Taiwan Scholarship
- (3) Financial Aid (For current students)

Cost of Study

Currently undergraduate students pay approximately £940.00 to £1,060.00 per semester for tuition and fees. For graduate students, the tuition and fees are approximately £940.00 to £1,080.00. Books and supplies cost about £200.00 per semester.

Housing and Living Costs

All international students have priority in applying for dormitory space. The cost is around £140.00 per semester. Eating at university dorm cafeterias costs around £120.00 per month.

How to Apply

Taiwan Tech runs 2 semesters in each academic year. Fall semester is from September to January of the following year, while spring semester is scheduled from February to June. The application deadline for admission in the fall/spring semester is Mar. 31/Oct. 31 in each year. All applications must apply online via the Admissions webpage on the university's English website. There is no application fee charge.

Correspondence and Information

OFFICE OF ACADEMIC AFFAIRS

Website: <http://www.academic.ntust.edu.tw/home.php?Lang=en>

Graduate-Tel: 886-2-2730-1296

Fax: 886-2-2730-1027

E-mail: admission@mail.ntust.edu.tw

Undergraduate-Tel: 886-2-2737-6300

Fax: 886-2-2737-6661

E-mail: undergraduate@mail.ntust.edu.tw



Campus Buildings



Swimming Pool



IB Plaza



Library Corner



Campus



TAIWAN TECH

National Taiwan University of Science and Technology

The Best Technology University in Taiwan

College of Engineering

College of Electrical Engineering and Computer Science

School of Management

College of Design

College of Liberal Arts and Social Sciences

Honors College

College of Intellectual Property Studies

Collect, collate, evaluate

The rise and fall of institutions in this year's Asia tables are tracked by the same methodology as the overarching World University Rankings

The *Times Higher Education Asia University Rankings* use the same methodology as the *Times Higher Education World University Rankings* to judge institutions' teaching, research, knowledge transfer and international outlook.

We employ 13 carefully calibrated performance indicators to provide the most comprehensive and balanced comparisons, which are trusted by students, academics, university leaders, industry and governments.

Our 13 performance indicators are grouped into five areas:

- Teaching: the learning environment (worth 30 per cent of the overall score)
- Research: volume, income and reputation (worth 30 per cent)
- Citations: research influence (worth 30 per cent)
- Industry income: innovation (worth 2.5 per cent)
- International outlook: staff, students and research (worth 7.5 per cent).

Exclusions

Institutions are excluded from the *Times Higher Education Asia University Rankings* if they do not teach undergraduates; if they teach only a single narrow subject; or if their research output amounted to fewer than 1,000 articles between 2007 and 2011 (200 papers a year).

In some exceptional cases, institutions that are below the 200-paper threshold are included if they have a particular focus on disciplines with generally low publication volumes, such as engineering or the arts and humanities.

Scores

To calculate the overall rankings, "Z-scores" were created for all datasets except the results of the academic reputation survey.

The calculation of Z-scores standardises the different data types on a common scale and allows fair comparisons between different types of data – essential when combining diverse information into a single ranking.

Each data point is given a score based on its distance from the mean average of the entire dataset, where the scale is the standard deviation of the dataset.

The Z-score is then turned into a "cumulative probability score" to arrive at the final totals.

If University X has a cumulative probability score of 98, for example, then a random institution from the same data distribution will fall below the institution 98 per cent of the time.

For the results of the reputation survey, the data become highly skewed in favour of a small number of institutions at the top of the rankings, so in 2011-12 we added an exponential component to increase differentiation between institutions lower down the scale, a method we have retained for these tables.

Data collection

Institutions provide and sign off their institutional data for use in the rankings.

On the rare occasions when a particular data point is missing – which affects only low-weighted indicators such as industrial income – we enter a low estimate between the average value of the indicators and the lowest value reported: the 25th percentile of the other indicators.

By doing this, we avoid penalising an institution too harshly with a "zero" value for data that it overlooks or does not provide, but we do not reward it for withholding them.

Phil Baty

INTERNATIONAL OUTLOOK: PEOPLE, RESEARCH (7.5%)

This category looks at diversity on campus and to what degree academics collaborate with international colleagues on research projects – both signs of how global an institution is in its outlook.

The ability of a university to attract undergraduates and postgraduates from all over the planet is key to its success on the world stage: this factor is measured by the ratio of international to domestic students and is worth **2.5 per cent** of the overall score.

The top universities also compete for the best faculty from around the globe. So in this category we adopt a **2.5 per cent** weighting for the ratio of international to domestic staff.

In the third international indicator, we calculate the proportion of a university's total research journal publications that have at least one international co-author and reward higher volumes.

This indicator, which is also worth **2.5 per cent**, is normalised to account for a university's subject mix and uses the same five-year window as the "Citations: research influence" category.

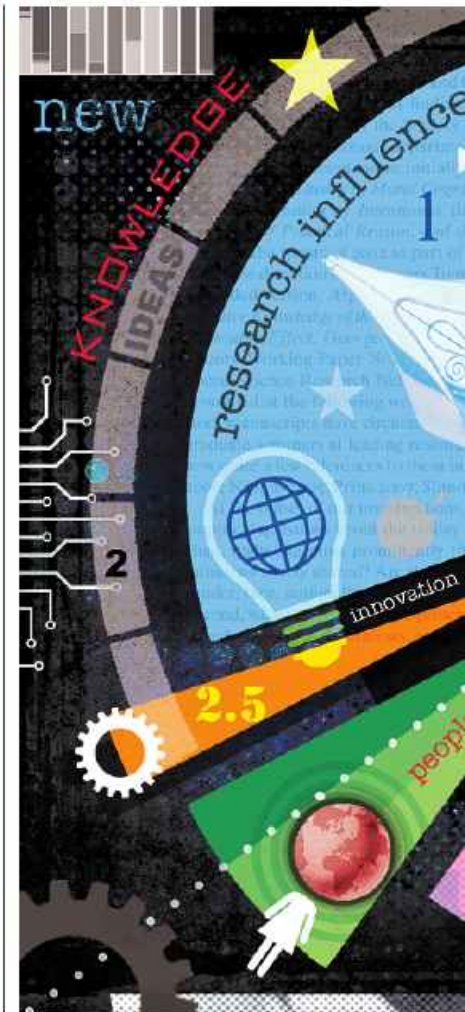
RESEARCH: VOLUME, INCOME, REPUTATION (30%)

This category is made up of three indicators. The most prominent, given a weighting of **18 per cent**, looks at a university's reputation for research excellence among its peers, based on the **10,000-plus responses to our annual academic reputation survey**.

This category also looks at university research income, scaled against staff numbers and normalised for purchasing-power parity.

This is a controversial indicator because it can be influenced by national policy and economic circumstances.

But income is crucial to the development of world-class research, and because much of it is subject to competition and judged by peer review, our experts suggested that it was a valid measure.



This indicator is fully normalised to take account of each university's distinct subject profile, reflecting the fact that research grants in science subjects are often bigger than those awarded for the highest-quality social science, arts and humanities research. It is given a weighting of **6 per cent**.

The research environment category also includes a simple measure of research productivity – research output scaled against staff numbers.

We count the number of papers published in the academic journals indexed by Thomson Reuters per academic, scaled for a university's total size and also normalised for subject. This gives an idea of an institution's ability to get papers published in quality peer-reviewed journals.

This indicator is worth **6 per cent** overall.



PHIL BRIDGMAN

CITATIONS: RESEARCH INFLUENCE (30%)

Our research influence indicator is the flagship. Weighted at 30 per cent of the overall score, it is the single most influential of the 13 indicators, and looks at the role of universities in spreading new knowledge and ideas.

We examine research influence by capturing the number of times a university's published work is cited by scholars globally. Our data supplier Thomson Reuters examined more than 50 million citations to 6 million journal articles, published over five years. The data are drawn from the 12,000 academic journals indexed by Thomson Reuters' Web of Science database and include all indexed journals published between 2007 and 2011.

Citations to these papers made in the six years from 2007 to 2012 are also collected.

The citations help to show us how much each university is contributing to the sum of human knowledge: they tell us whose research has stood out, has been picked up and built on by other scholars and, most importantly, has been shared around the global scholarly community to push further the boundaries of our collective understanding, irrespective of discipline.

The data are fully normalised to reflect variations in citation volume between different subject areas. This means that institutions with high levels of research activity in subjects with traditionally high citation counts do not gain an unfair advantage.

We exclude from the rankings any institution that publishes fewer than 200 papers a year to ensure that we have enough data to make statistically valid comparisons.

INDUSTRY INCOME: INNOVATION (2.5%)

A university's ability to help industry with innovations, inventions and consultancy has become a core mission of the contemporary global academy.

This category seeks to capture such "knowledge transfer" by looking at how much research income an institution earns from industry, scaled against the number of

academic staff it employs.

"Industry income: innovation" suggests the extent to which businesses are willing to pay for research and a university's ability to attract funding in the competitive commercial marketplace – useful indicators of institutional quality.

The category is worth 2.5 per cent of the overall ranking score.

TEACHING: THE LEARNING ENVIRONMENT (30%)

This category employs five separate performance indicators designed to provide a clear sense of the teaching and learning environment of each institution from both the student and the academic perspective.

The dominant indicator here uses the results of the world's largest invitation-only academic reputation survey.

Thomson Reuters carried out its latest reputation survey – a worldwide poll of experienced scholars – in spring 2013.

It examined the perceived prestige of institutions in both research and teaching. There were more than 10,000 responses, statistically representative of global higher education's geographical and subject mix.

The results of the survey with regard to teaching make up 15 per cent of the overall rankings score.

The teaching and learning category also employs a staff-to-student ratio (an institution's total student numbers) as a simple (and admittedly crude) proxy for teaching quality.

The proxy suggests that where there is a healthy ratio of students to staff, the former will get the personal attention they require from the institution's faculty.

This measure is worth 4.5 per cent of the overall ranking score.

The teaching category also examines the ratio of doctoral to bachelor's degrees awarded by each institution.

We believe that institutions with a high density of research students are more knowledge-intensive and that

the presence of an active postgraduate community is a marker of a research-led teaching environment valued by undergraduates and postgraduates alike.

The doctorate-to-bachelor's ratio is worth 2.25 per cent of the overall ranking score.

The teaching category also uses data on the number of doctorates awarded by an institution, scaled against its size as measured by the number of academic staff it employs.

As well as giving a sense of how committed an institution is to nurturing the next generation of academics, a high proportion of postgraduate research students also suggests the provision of teaching at the highest level that is thus attractive to graduates and effective at developing them.

Undergraduates also tend to value working in a rich environment that includes postgraduates. This indicator is normalised to take account of a university's unique subject mix, reflecting the different volume of doctoral awards in different disciplines, and makes up 6 per cent of overall scores.

The final indicator in the category is a simple measure of institutional income scaled against academic staff numbers.

This figure, adjusted for purchasing-power parity so that all nations may compete on a level playing field, indicates the general status of an institution and gives a broad sense of the infrastructure and facilities available to students and staff. This measure is worth 2.25 per cent overall.



Major Fields of Study

Engineering
Science
Business Administration
Economics
Social Sciences
Law
Architecture
Design
Humanities
Music
Tourism

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Located in Turkey's capital Ankara, a vibrant metropolis of 4.5 million.

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Highly acclaimed international faculty members from 40 countries.

Cutting-edge research laboratories and facilities, and an excellent academic library.

Generous scholarships available for undergraduate and graduate students.

A hub of academic, social, and cultural activity.

Ranked 31st (jointly) in *Times Higher Education* 100 Under 50 University Rankings (2014).

Ranked 31st in *Times Higher Education* Asia University Rankings (2014).

Ranked 98th in *Times Higher Education* Top 100 Universities for Engineering and Technology (2013).



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With more than 27 million students enrolled, India now has the second-largest higher education system in the world. Enrolments surpassed those in the US in 2010. Since then, the gap between India and the world's largest system, China, has continued to close: and with a much larger (and still growing) proportion of young people in its population, India will soon topple its eastern neighbour.

Things have changed rapidly: seven years ago, India was struggling to achieve a gross enrolment ratio of 12 per cent, but today it has breached 20 per cent. Our target to reach 30 per cent by 2020 appears to be well within range.

When India achieved independence in 1947, it had only 20 universities and about 500 colleges. Today the figure is 723 universities and university-level institutions, 37,204 colleges and 11,356 diploma-level bodies. The country has by far the highest number of tertiary education institutions in the world and new ones are being set up almost every day.

Over the past decade, India has witnessed rapid economic growth, creating new jobs that require higher qualifications. The aspirations of the young have also risen, so there is huge demand for higher education. Fortunately, India's academy has the momentum to meet it.

However, expansion has its downsides; for example, there is mounting concern about quality, particularly as a result of recent dramatic growth.

India has devised a multi-pronged strategy to meet the quality challenge. This includes filling academic shortages; addressing problems with scholarly standards and accountability; using technology more effectively; addressing issues of governance; and increasing funding while using it more wisely.

In addition, the country has finally woken up to the centrality of evaluation, benchmarking and rankings: both of the Indian academy's regulators – the University Grants Committee and the All India Council for Technical Education – state that all higher education institutions must now be accredited.

Although accreditation has been made mandatory, the challenges are huge because of the sheer numbers involved. Currently, there are only two government-backed accreditation agencies – the National Assessment and Accreditation Council for general education and the National Board of Accreditation for technical education. There is no doubt that their capacities need to be multiplied several-fold to make any meaningful dent in the

Bigger can be better

Regulation and world rankings provide a way to meet the challenges presented by India's higher education expansion, argues Ashok Thakur



problem: the NAAC, for example, has been able to accredit only 172 universities (28 per cent) and 4,857 colleges (15 per cent) over the past 19 years.

It is hoped that quality will be bolstered with the likely establishment of the National Accreditation Regulatory Authority, a proposal that is being seriously explored.

But to meet the huge challenges of accreditation, other agencies, including private and state bodies, will have to help.

Another positive development has been a final resolution of the argument about whether the country should fully commit itself to taking part in the world university rankings. This has mercifully been laid to rest by none other than the president of India, Pranab Mukherjee, who has made it clear that as a matter of policy, all institutions in the country have to participate wholeheartedly in the rankings process.

The Ministry of Human Resource

Development's Department of Higher Education has been actively engaged in promoting participation by Indian universities and colleges in the world rankings over the past two years (eg, conducting workshops with *Times Higher Education*, Thomson Reuters and others). This is having an effect: for example, the IIT Council, the apex body for all 16 Indian institutes of technology, has decided to participate systematically in the rankings.

In the days ahead, more and more Indian institutions will engage with agencies to evaluate and benchmark themselves. They are working to make ranking methods more transparent and relevant in the Indian context.

Each centrally funded institution will have a senior nodal faculty member in charge of collecting data for the rankings, and the ministry will proactively sponsor more discussions and workshops so that institutions can work out common strategies for collecting and reporting information in a systematic and consistent manner.

Because research and publication is a vital aspect of the rankings, it is important that Indian universities' doctoral and postdoctoral programmes are strengthened. As a large quantity of research in the country is done outside the university system – for example, in national research laboratories – the recent approval of joint appointments involving the laboratories and the academy will go a long way not only to filling vacant academic positions, but also to strengthening university research and linking it to industry and entrepreneurship.

The Central Universities' efforts to fill vacant posts and achieve the ministry's target of a 1:1.5 staff-to-student ratio is another welcome step.

No matter what fears we may have about international ranking systems, they are here to stay and cannot be wished away. Students and their parents can now take more informed decisions when selecting institutions and programmes, as the rankings ensure that information is available to all on a transparent basis. How institutions are perceived globally is vital and this is influenced by the rankings.

With the new government now taking over and with its stated commitment to providing students with quality higher education, there is no doubt that the participation of the universities and institutions of national importance will only continue to grow.

Ashok Thakur is India's secretary for higher education.

Cultivation of pioneering spirits

Kyoto's international strategy promises to spread its creative virtues across the globe, says Hiroshi Matsumoto

Since its foundation in 1897, Kyoto University has fostered a distinct culture of open-minded dialogue and academic freedom, making significant social contributions and deepening the pool of human knowledge. In the words of the university's mission statement, it has sought, through its education and research endeavours, to "promote harmonious coexistence within the Earth's human and ecological community".

As president of Kyoto, I believe that providing opportunities for students and researchers to form diverse and vibrant relationships with their mentors, peers, even their rivals, is a key nutrient for a fertile academic environment. Our proactive efforts to internationalise our campuses, making them ever more accessible to students and researchers with diverse backgrounds from around the world, are one aspect of tending such fertile ground.

In response to globalisation's rapid advance, Kyoto has formulated a new international strategy: The 2x by 2020 Initiative (pronounced "Double by twenty-twenty"). It sets specific targets to double the university's performance in key internationally related indices, such as those concerning student and researcher mobility, multinationally authored academic papers, and the holding of international academic symposia. Through the attainment of such measurable goals, we seek to ensure that our internationalisation continues to progress with stability and a sense of purpose.

As part of 2x by 2020, we are in the process of establishing the Kyoto University Global Academy, a diverse suite of internationally oriented education and research programmes that seek to open the university's doors ever wider to the global community: providing increased opportunities for overseas students; expanding our cooperative research involvement; and enhancing our contributions to national and international development.

Through the Global Academy and other initiatives, Kyoto is seeking to



remove the linguistic and cultural barriers that have long made it difficult for international students to study in Japan.

The number of degree courses we offer in English continues to increase dramatically, and international students are given comprehensive support in their daily lives (including everything from making visa applications to securing accommodation). It is no longer necessary for students to have a vested interest in Japan's language and culture to obtain a degree from one of the country's top universities.

Throughout its history, Kyoto's scholars have been known for their long-term outlook – eschewing transient academic fads and fashions in favour of pursuing knowledge of enduring value. This attitude towards education and research reflects the 1,000-year-old philosophical traditions of Kyoto City itself.

In keeping with that philosophy, the university's campuses offer a broad-minded and accommodating academic environment where researchers can engage in long-term studies and are encouraged to explore new frontiers in diverse fields.

The effectiveness of this approach to fostering world-class scholarship is testified by the accolades conferred on our alumni and researchers, notably eight Nobel prizes, two Fields medals and one Gauss prize.

Such internationally recognised accomplishments owe a great deal to the university's distinctive academic style, which encourages the creativity essential for groundbreaking research and discovery.

Another key factor is our state-of-the-art laboratories and research facilities, which provide students and researchers with the hands-on practical experience that is vital to their development as scientists and scholars.

One prominent recent example of the radical breakthroughs encouraged by Kyoto's unique academic milieu are the achievements of Shinya Yamanaka (pictured), director of our Center for iPS Cell Research and Application. In 2012, Yamanaka was awarded the Nobel Prize in Physiology or Medicine for his outstanding discoveries in the field of stem-cell research.

Yamanaka's achievements are remarkable in that they have brought ideas and concepts that were previously outside the realms of recognised science firmly into the fold of scientific possibility: until relatively recently, the concept that adult cells could be genetically "reprogrammed" was not the stuff of science but of science fiction.

Pursuing the realisation of such "pre-scientific possibilities" requires a great deal of courage and conviction. The ability to bring concepts that were previously beyond our grasp into the realms of acknowledged science is a remarkable feat: it requires boldness to dare to reach for that which is as yet unknown.

The cultivation of such a pioneering, adventurous spirit in its students and researchers has been a central goal of Kyoto since its inception and remains so to this day. Now, under the auspices of the 2x by 2020 Initiative, we hope to impart that spirit to ever greater numbers of people across the world.

Hiroshi Matsumoto is president of Kyoto University.

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Shaping hearts and minds

'Relevant excellence' will help Thailand escape the middle-income trap, argues Sakarindr Bhumiratana

Despite more than a decade of double-digit economic growth, Thailand still finds itself stuck in the middle-income trap. A major problem is that its science, technology and innovation infrastructure remains under-developed; the talent and skills the country needs are in short supply, a major spanner in the works that has stalled the engine of economic growth.

Thai universities are expected to play a major role in helping the country escape the middle-income trap by boosting the livelihood of people in its rural areas (more than 60 per cent of the Greater Mekong sub-region's population still reside in the countryside).

As Thailand's premier science institution, King Mongkut's University of Technology, Thonburi is working intensively within a group of specially selected National Research Universities to rise to the challenge – striving not only for excellence but also for "relevant excellence". It is indeed fortunate that by striving to be meaningfully excellent, the institution delivers many of the measurable outputs of a world-class university.

KMUTT's success can be attributed to its culture of innovation in science and technology, augmented by its pioneering pedagogic programmes. This

environment has been nurtured over the university's 50-year lifespan by continuity of leadership.

The institution was the first in Thailand to establish specialist graduate schools in energy, environment, materials science and biotechnology. The schools are the cornerstone of our work and the core reason for our selection as a National Research University.

Since our fledgling days as a technical college, we have kept sacrosanct our partnership with the private sector and its practical approach. As a research university, we ensure that the problems selected for study must not only deliver academic insights, but also provide regional, social and economic benefits.

KMUTT was the first university to set up select "practice schools" – a concept that has led the way to strong "work-integrated learning" programmes throughout the institution. These support private-sector innovation by producing problem-solving researchers, engineers and technicians.

The practice school concept, formulated nearly 20 years ago, was part of our attempt to provide "constructionist education": this holds that students learn best when they are actively involved in real-world tasks. The pedagogic programme emerged from our early realisation that the university had a responsibility to help build science

literacy throughout Thailand. (We could see early on that the economic trap would be sprung!)

We have established a small high school for the gifted and work closely with other such schools and programmes. However, on the other end of the accessibility curve, we also work with many marginalised schools providing education under the harshest conditions. Students are provided with opportunities to understand the social context of science and technology and to exercise their minds to help find solutions to social problems. Again, our principal aim is developing relevant excellence.

Serving the community, from the environs of our campuses to more rural and marginalised settings, has been our philosophy since inception. Thirty-five years ago, we were asked to take part in a community development programme under the auspices of a Royal Project and Royally Recommended Project (set up by King Bhumibol Adulyadej to improve the lot of the Thai people).

We helped set up and operate rural agro-processing factories as part of efforts to eradicate opium production in the North and beat the Communist Party of Thailand in the tug-of-war for the people's hearts and minds. This community and youth work has grown

into a maze of networks with non-governmental organisations and other institutions. On campus, the work is coordinated and promoted by our University for Community/Society Centre. Our goal is not only to contribute to the betterment of less fortunate communities by strengthening science, technology, engineering and mathematics teaching in rural schools, but also to develop good citizens.

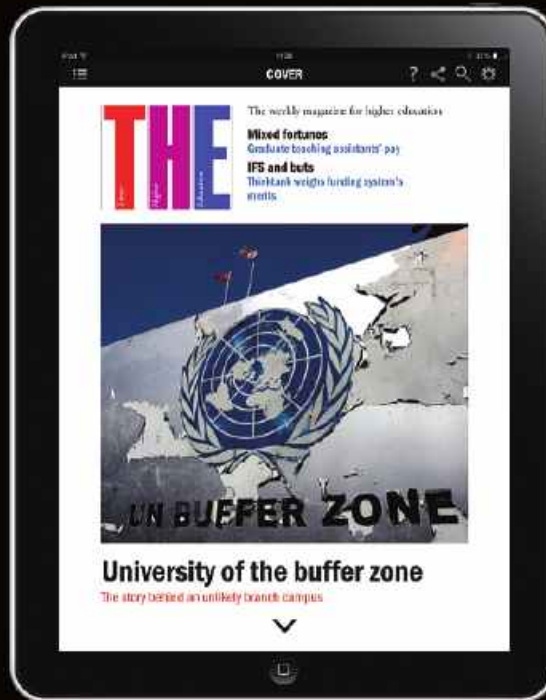
Despite our strong local and regional commitments, world-class status is very important to us, as it enables the university to work with its global peers to share insights and to learn. It also gives a considerable boost to our efforts to internationalise for the sake of our students, helping us prepare them to be global change agents.

The university can certainly offer an interesting and happy workplace and the famous "Thai broad smile". But our most vital contributions are fostering talent, building a talent network and generating collective impact through partnerships – the relevant excellence that will help Thailand to escape the middle-income trap.

Sakarindr Bhumiratana is president, King Mongkut's University of Technology, Thonburi.



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Benchmarks for assessment

International collaboration as measured by world rankings is key to Asia's future, argues Justin Kim

Innovation is a key driver for Asia's fastest-growing economies and universities are vital sources of it. There are several higher education institutions that have put their names on the world map by becoming top-ranking universities in a short period of time: with the right strategy, others can follow suit.

Analysis of Thomson Reuters' data shows that the volume of research produced by Asian universities continues to increase and even outperforms non-Asian universities in certain fields. These leading areas are often aligned with industrial sectors that support host nations' economic growth: South Korea, for example, consistently demonstrates outstanding research in materials science, as the semiconductor industry has contributed substantially to the growth of its economy.

However, gaining international recognition for the overall quality of its research remains a challenge for the region. Although Asian universities conduct good research in some areas, they are not well recognised beyond their own shores. This anonymity can make it difficult for them to find academic partners globally, nurture new research continually and take their work to the next level.

This can be an obstacle for Asian universities in their efforts to improve their competitiveness because global collaboration is an important catalyst for more innovative and high-quality research. Working with the global community helps universities to access more diverse and creative ideas and discoveries, and provides more opportunities for participation in groundbreaking research.

Asian universities will progress only if they make more effort to promote themselves across the world and proactively engage with their global peers, regardless of the language barriers and cultural differences. Such activity can include co-authoring papers, forming exchange programmes and establishing joint research laboratories with overseas partners.

It is also important for Asian researchers to publish papers in world-class journals and attend well-known international conferences so that they can engage with their global peers continually.

Industrial collaboration is another

essential catalyst. Innovation is a hot-ticket item for many technology companies. The high-tech industry aggressively seeks universities as research partners and Asian institutions should take advantage of this demand. Having a strong foothold in emerging research areas can attract many companies from around the world, which can create greater research funding opportunities and in turn help universities to hire more talent to expedite progression.

Our analysis of the Thomson Reuters data used to create the *Times Higher Education* World University Rankings and the Asia University Rankings shows that world-class universities must be strong not only in research but also in teaching.

As would be expected, the data demonstrate that the higher the research or teaching score, the higher the overall position in the *THE* World University Rankings, which use 13 separate performance indicators covering teaching, research, knowledge transfer and international outlook. Top

universities tend to excel in both research and teaching.

Universities with good research capability tend to provide better teaching programmes, which can educate students more effectively and better prepare them to provide what society needs. This helps the university to attract more talented students and researchers, which in turn supports and sustains its core research competency.

Building this sustainable cycle is critical to the success of Asian universities that aim to achieve world-class status. Research and teaching should be framed to influence each other so that the university's overall competency constantly improves. Within this framework, internationalisation and collaboration with industry become catalysts to strengthen the university's core.

Asian universities need their own strategic framework in which the four major components – teaching, research,

knowledge transfer and international outlook – are well aligned, allowing their strategic plans and resources to be managed effectively. Without a strategic framework it can be easy to stray off course, lose sight of the overall plan and mismanage resources.

Universities operate in a dynamic environment. They must continuously monitor global trends and evaluate their own strengths and weaknesses based on a strategic framework they have developed for themselves. The *THE* rankings provide an excellent platform for universities to benchmark various aspects of their core competencies.

Within such a strategic framework, benchmarking and evaluating rankings data will provide accurate and clear insights for Asian universities aspiring to become world-class institutions.

Justin Kim is Thomson Reuters' regional director for intellectual property and science, North Asia, including South Korea, Taiwan, Hong Kong and Macau.

