

Competing in a globalising world: International ranking of South African universities

Prof Anastassios Pouris and Ms Anthipi Pouris

The rankings of higher education institutions are important to students, research administrations, industries and academics. A university's performance is indicative of postgraduate employment. National research administrations are interested to know the performance of the institutions they support, and individual academic institutions are interested to know their performance, so that they can adjust their policies and strategies appropriately. South Africa, like most of the developing countries, does not produce rankings similar to those in the developed world.

Seven South African universities (out of the 22 in the country) are included in the top 1% of the world's institutions cited in international scientific literature. These institutions are the universities of Cape Town (UCT), Pretoria (UP), the Free State (UFS), the Witwatersrand (Wits), KwaZulu-Natal (UKZN), Stellenbosch (SU) and Rhodes.

A number of national and international rankings of higher education institutions exist. These rankings include those by the *Times Higher Education Supplement* (THES, 2008), the US News and World Report (US News, 2009) and the Shanghai Jiao Tong University (2009). In a globalising world, students, staff and funders prefer to associate themselves with high-ranked institutions rather than with low-ranked ones.

The rankings are also so criticised (Bowden, 2000; Dill et al., 2005, Taylor et al., 2007). One criticism is that complex multi-indicator rankings are not able to assist in the development of policy/strategy guidelines. For example, in the Shanghai Jiao Tong ranking, 30% of the weighting is allocated for alumni and staff of the institution who have won Nobel prizes and Fields medals. While single indicator rankings may not reflect all desirable characteristics of universities, they are amenable to manipulation through appropriate management instruments.

For this investigation, the Essential Science Indicators (ESI) database of the Institute for Scientific Information (ISI) Thomson Reuters is used. In its ESI database, ISI Thomson Reuters provides information of the most cited institutions worldwide during the last ten years. The database identifies 22 scientific fields. To compensate for varying citation rates across scientific fields, different thresholds are applied to each field.

The thresholds are set to select the top 1% of entities from each scientific field. Hence, institutions appear in the dataset only if they receive citations over the threshold. The thresholds of the different scientific disciplines for two different ten-year periods (ending April 2005 and April 2009) appear in Table 1.

Table 1 shows that different disciplines have substantial different thresholds and that for most disciplines, the thresholds are increasing over time.

The ESI database was investigated in order to identify the South African institutions that were included.

Tables 2 and 3 show the number of citations received by the various universities in the different disciplines and the number of publications authored by those institutions respectively.

The identified institutions, together with their rankings, appear in Table 4. The table also shows the number of institutions in each discipline in the database. The different universities have a varied presence in different disciplines. For example, the University of Cape Town has a presence in nine scientific disciplines, with the best ranking in environment/ecology (114th in the world). On the other hand, Rhodes University and the University of the Free State have a presence only in one discipline – plant and animal sciences.

In comparison with Table 1, Table 4 can also identify disciplines that are underemphasised by the universities in the country. For example, computer sciences and material sciences are absent from the list, indicating that no university in the country reached the relevant thresholds for these fields.

Comparisons of the individual rankings with the total number of

→ Table 1: Scientific field citation threshold for institutions

Scientific field	Threshold (April 2005)	Threshold (April 2009)
Agricultural sciences	550	769
Biology and biochemistry	3 759	3 774
Chemistry	2 540	2 918
Clinical medicine	1 121	1 496
Computer science	496	845
Economics and business sciences	1 015	1 597
Engineering	525	765
Environment/ecology	1 181	1 585
Geosciences	1 812	2 295
Immunology	3 670	3 708
Materials science	757	1 204
Mathematics	1 102	1 584
Microbiology	2 972	2 969
Molecular biology and genetics	6 597	6 413
Multidisciplinary	516	496
Neuroscience and behaviour	3 679	3 946
Pharmacology and toxicology	1 771	1 995
Physics	3 633	4 397
Plant and animal sciences	959	1 223
Psychiatry/psychology	1 312	2 070
Social sciences, general	335	507
Space science	6 754	10 089

institutions in the database provide an indication of the extent to which the institution runs the risk of being dropped from the database.

The ESI database is commercially available and contains data for 4 050 institutions from around the world.

Inclusion in the database means that the particular institution meets the minimum citation threshold and that the institution is part of the top 1% of institutions in the world in the particular discipline. University administrations most likely want to have a presence in as many disciplines as possible and the highest ranking possible.

The advantage of the developed ranking is that it can provide a picture of the particular institutions over time. Table 5 shows, for example, the South African institutions' rankings during 2005. In comparison, tables 4 and 5 can have a valuable inter-temporal

→ Table 2: Number of citations of South African institutions in ESI database (1 January 1999 to 30 April 2009)

Discipline	UCT	UP	UFS	Wits	UKZN	US	Rhodes
Biology and biochemistry	6 788						
Chemistry	3 864			4 661		3 845	
Clinical medicine	21 346	4 496		14 808	5 968	11 405	
Engineering	875	1 533		1 121			
Environment/ecology	8 312	3 823			2 858	4 120	
Geosciences	5 665			4 816			
Plant and animal sciences	7 755	9 546	1 362	2 473	3 465	4 388	2 925
Social sciences, general	2 748	637		2 653	729	564	
Agricultural sciences		1 001				1 182	
Immunology	5 822						
Microbiology						3 329	
Psychiatry/psychology						2 303	

→ Table 3: Number of publications of South African institutions in ESI database (1 January 1999 to 30 April 2009)

Discipline	UCT	UP	UFS	Wits	UKZN	SU	Rhodes
Biology and biochemistry	470						
Chemistry	483			537		3 845	
Clinical medicine	2 079	555		1 509	555	11 405	
Engineering	250	533		361			
Environment/ecology	636	492		217	195	4 120	
Geosciences	617			682			
Plant and animal sciences	1 077	1 914	340	405	403	4 388	586
Social sciences, general	627	319		656	142	564	
Agricultural sciences		202				1 182	
Immunology	266						
Microbiology						3 329	
Psychiatry/psychology						2 303	

→ Table 4: International rankings (1 January 1999 to 30 April 2009)

Discipline	UCT	UP	UFS	Wits	UKZN	SU	Rhodes	Total institutions
Biology and biochemistry	448							687
Chemistry	771			684		774		907
Clinical medicine	456	1 335		593	1 124	726		2 904
Engineering	955	637		802				1 039
Environment/ecology	114	286		353	353	259		515
Geosciences	202			245				429
Plant and animal sciences	166	122	771	509	389	307	443	835
Social sciences, general	197	541		204	499	594		640
Agricultural sciences		326				278		413
Immunology	192							294
Microbiology						288		313
Psychiatry/Psychology						352		367

→ Table 5: International ranking (1 January 1995 to 30 April 2005)

Scientific discipline	UCT	UP	UFS	Wits	UKZN	SU
Biology and biochemistry	444					
Chemistry				604		
Clinical medicine	497	1 136	2 511	560	984	764
Engineering		573		778		
Environment/ecology	103	265			366	
Geosciences	207			166		
Materials science				521		
Plant and animal sciences	188	200	489	533	271	427
Social sciences, general	279			244	565	

(Source: Pouris 2007)

assessment. The University of Cape Town had, for example, a presence in six scientific fields. In 2009, its presence increased to nine fields.

About the authors



Prof Anastassios Pouris is Director of the Institute for Technological Innovation at the University of Pretoria. His research is focused on science, technology and innovation policy studies, including assessments and international benchmarking.

UCT was ranked number 497 in clinical medicine. In 2009, the university was ranked number 456 in the same discipline. 📍



Ms Anthipi Pouris is associated with the National Research Foundation and the University of Pretoria. She has been involved in scientometrics research in South Africa since 1987.

References

- Bowden, R. 2000. Fantasy higher education: university and college league tables. *Quality in Higher Education*, 6(1):41–60.
- Dill, D & Soo, M. 2005. Academic quality, league tables, and public policy: a cross-national analysis of university rankings. *Higher Education: The International Journal of Higher Education and Educational Planning*, (49):495–533.
- Pouris, A. 2007. The international performance of the South African academic institutions: a citation assessment. *Higher Education: The International Journal of Higher Education and Educational Planning*, 54(4):501–509.
- Shanghai Jiao Tong University. 2009. Academic rankings of world universities. Graduate School of Education Shanghai Jiao Tong University. [Online]. Available at: www.arwu.org (accessed in August 2009).
- Taylor, P & Braddock, R. 2007. International university ranking systems and the idea of university excellence. *Journal of Higher Education Policy and Management*, 29(3):245–260.
- THES. 2009. World University Rankings 2008. *Times Higher Education*. [Online]. Available at: <http://www.timeshighereducation.co.uk/hybrid.asp?typeCode=243&pubCode=1&navcode=137> (accessed in August 2009).
- US News and World Report. 2009. World's best colleges and universities. [Online]. Available at: <http://www.usnews.com/sections/education/worlds-best-colleges/index.html> (accessed in August 2009).