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Bibliometric indicators are used worldwide to assess the scientific production and to measure the diffusion and use of research results produced by countries, universities, institutions and researchers. Normally indicators are based on bibliographic databases as ISI Web of Knowledge and Scopus. However it is important to consider the limitations and differences showed by ISI Web of Knowledge and Scopus.

New indicators:

- The Relative Impact (Q) defined as the ratio between the actual number of citations obtained and the expected citations of the same set of documents if they were to perform as the world average.
- The Field Average Relative Impact (^aQ) defined as the relation between the actual number of citations obtained and the sum of the expected citations of the same set of documents if they were to perform as the world average within each field as defined in the Essential Science Indicators of Thomson Reuters.
- The Relative Top 10% (^aT₁₀) is the number of documents a given university has among the 10% best performing documents of each field, relative to the world average.
- The Production and Citation Projected h-index (^ah₃) is calculated as the usual h-index of the actual documents produced (in 2004) with their projected citations in a time period three times the one observed (2004 to January 2009) and then adjusted for a standard university production (taken as the average among all 36 universities considered in this study).

Table 1. The total number of documents, mean citation rate, Q, ^aQ, h-index, ^ah₃ and ^aT₁₀ for Spanish universities

University	Total documents	Impact	Q	^a Q	h index	^a h ₃	^a T ₁₀
U. Alcalá	421	6.67	0.97	0.89	24	71.7	0.93
U. Alicante	451	9.17	1.35	1.36	29	78.3	1.46
U. Aut. Barcelona	1543	8.81	1.26	1.23	41	80.9	1.22
U. Aut. Madrid	1558	12.57	1.76	1.5	55	98.6	1.49
U. Barcelona	2497	11.27	1.59	1.43	57	89.1	1.57
U. Castilla-La Mancha	429	7.61	1.23	1.27	26	74.1	1.37
U. Complutense Madrid	1978	7.55	1.10	1.05	46	74.3	0.99
U. Córdoba	459	9.92	1.43	1.36	27	73.7	1.13
U. Extremadura	422	7.21	1.05	1.04	24	67.5	0.78
U. Granada	1058	10.33	1.53	1.57	34	67.6	0.90
U. La Laguna	420	8.98	1.30	1.19	30	80.2	1.21
U. Málaga	538	6.57	1.03	1.08	23	64.6	1.01
U. Murcia	566	7.69	1.10	1.09	27	68.6	0.87
U. Oviedo	803	10.13	1.33	1.26	30	74.3	1.10
U. País Vasco	967	7.49	1.26	1.21	34	76.0	1.18
U. Pol. Cataluña	1240	5.88	1.06	1.22	33	65.9	1.56
U. Pol. Madrid	836	7.37	0.75	0.91	24	56.6	0.88
U. Pol. Valencia	878	7.01	1.19	1.33	36	75.3	1.43
U. Rovira i Virgili	420	9.62	1.39	1.32	29	83.1	1.71
U. Salamanca	650	6.96	1.01	0.93	27	69.0	0.99
U. Santiago Compostela	1118	8.24	1.22	1.13	37	72.3	1.04
U. Sevilla	1027	7.56	1.12	1.15	36	71.4	1.00
U. Valencia	1705	12.14	1.76	1.63	49	83.4	1.35
U. Valladolid	491	7.07	1.08	1.08	25	64.0	1.01
U. Vigo	624	7.27	1.07	1.11	26	66.3	0.93
U. Zaragoza	900	8.07	1.20	1.2	34	75.8	1.31

Table 2. The total number of documents, mean citation rate, Q, ^aQ, h-index, ^ah₃ and ^aT₁₀ for Portuguese universities.

University	Total documents	Impact	Q	^a Q	h index	^a h ₃	^a T ₁₀
U. Coimbra	852	7.23	1.10	1.09	31	72.8	1.14
U. Lisboa	823	9.25	1.34	1.24	36	80.4	0.99
U. Porto	1235	8.70	1.28	1.22	39	72.8	1.04
U. Técnica Lisboa	1291	8.24	1.27	1.29	43	77.4	1.30

Table 3. The total number of documents, mean citation rate, Q, ^aQ, h-index, ^ah₃ and Top10% for Brazilian universities.

University	Total documents	Impact	Q	^a Q	h index	^a h ₃	^a T ₁₀
U. Minas Gerais	894	6.50	0.91	0.84	31	68.4	0.65
U. Rio Grande Sul	1202	6.27	0.92	0.85	29	61.7	0.56
U. Rio Janeiro	1792	5.80	0.84	0.77	36	61.5	0.57
U. Estadual Paulista	1350	5.05	0.72	0.71	29	55.5	0.48
U. São Paulo	5301	6.40	0.91	0.85	52	67.0	0.72
U. Est. Campinas	2035	6.36	0.93	0.87	36	61.3	0.83

Comments:

- ✓ Values of ^aQ above the values of Q may be explained by the importance of Engineering and Computer Science. The mean citation rate for these fields is below the global mean for all documents in all fields.
- ✓ The ^aT₁₀ indicator takes similar values for Spain (1.16±0.26) and Portugal (1.12±0.12) and lower values (0.61±0.08) for Brazil.
- ✓ The results show that the ^ah₃ indicator gives a measure of quality different from the usual h-index and different from the other indicators considered.

Table 4. Number of doctorates (doctor.) and number of documents (docs.) indexed in the WoS (2004) per teaching staff for Spanish universities.

University	Doctorates concluded	Teaching staff	Doctor./Teachers	Docs./Teachers	Docs./Doctor
U. Alcalá	164	848	0.19	0.50	2.57
U. Alicante	74	1147	0.06	0.39	6.09
U. Aut. Barcelona	321	1.508	0.21	1.02	4.81
U. Aut. Madrid	735	1.658	0.44	0.94	2.12
U. Barcelona	485	2.651	0.18	0.94	5.15
U. Castilla-La Mancha	98	1320	0.07	0.33	4.38
U. Complutense Madrid	929	3.975	0.23	0.50	2.13
U. Córdoba	108	897	0.12	0.51	4.25
U. Extremadura	95	1337	0.07	0.32	4.44
U. Granada	247	2794	0.09	0.38	4.28
U. La Laguna	61	1512	0.04	0.28	6.89
U. Málaga	200	1537	0.13	0.35	2.69
U. Murcia	176	1380	0.13	0.41	3.22
U. Oviedo	170	1723	0.10	0.47	4.72
U. País Vasco	234	3052	0.08	0.32	4.13
U. Pol. Cataluña	167	1.693	0.10	0.73	7.43
U. Pol. Madrid	180	2393	0.08	0.35	4.64
U. Pol. Valencia	251	2047	0.12	0.43	3.50
U. Rovira i Virgili	60	502	0.12	0.84	7.00
U. Salamanca	577	1549	0.37	0.42	1.13
U. Santiago Compostela	199	1764	0.11	0.63	5.62
U. Sevilla	351	3182	0.11	0.32	2.93
U. Valencia	337	2.273	0.15	0.75	5.06
U. Valladolid	133	1620	0.08	0.30	3.69
U. Vigo	91	1081	0.08	0.58	6.86
U. Zaragoza	191	2162	0.09	0.42	4.71

Table 5. Number of doctorates (doctor.) and number of documents (docs.) indexed in the WoS (2004) per teaching staff for Portuguese universities.

University	Doctorates concluded	Teaching staff	Doctor./Teachers	Docs./Teachers	Docs./Doctor
U. Coimbra	98	1252	0.08	0.68	8.69
U. Lisboa	121	1407	0.09	0.58	6.80
U. Porto	154	1792	0.09	0.69	8.02
U. Técnica Lisboa	135	1585	0.09	0.81	9.56

Table 6. Number of doctorates (doctor.) and number of documents (docs.) indexed in the WoS (2004) per teaching staff for Brazilian universities.

University	Doctorates concluded	Teaching staff	Doctor./Teachers	Docs./Teachers	Docs./Doctor
U. Minas Gerais	326	2662	0.12	0.34	2.74
U. Rio Grande Sul	423	2492	0.17	0.48	2.84
U. Rio Janeiro	645	3259	0.20	0.55	2.78
U. Estadual Paulista	625	2785	0.22	0.48	2.16
U. São Paulo	2089	4012	0.52	1.32	2.54
U. Est. Campinas	763	1515	0.50	1.34	2.67

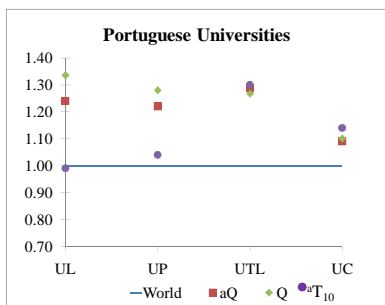
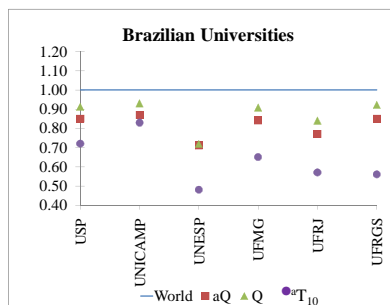
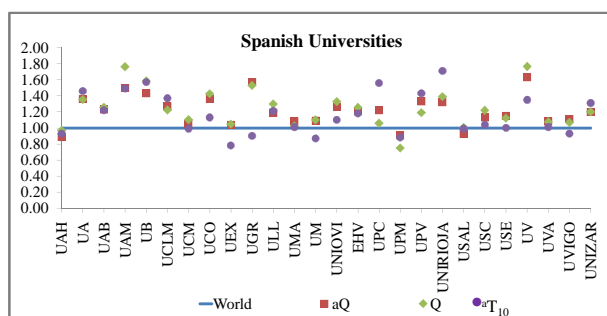


Figure 1. Relative Impact of the publications and Relative Top10% for the studied universities.

Comments:

Institutional size correction by the number of teaching staff:

- ✓ The scientific production per member of the teaching staff has high variations among universities but there is a mild variations between Portugal and Brazil if we consider the mean of the set of all universities.
- ✓ The ratio of the number of documents to the number of doctorates awarded suggests that the publications from Portuguese universities may be partly due to the permanent staff while in Spain and Brazil the publications are largely mediated by doctoral students.

