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A bibliometric analysis of leading universities in innovation research



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ABSTRACT

The number of innovation studies with a management perspective has grown considerably over the last 25 years. This study identified the universities that are most productive and influential in innovation research. The leading innovation research journals were also studied individually to identify the most productive universities for each journal. Data from the Web of Science were analyzed. Studies that were published between 1989 and 2013 were filtered first by the keyword “innovation” and second by 18 management-related research areas. The results indicate that US universities are the most productive and influential because they account for the most publications with a high number of citations and high h-index. Following advances in the productivity of numerous European journals, however, universities from the UK and the Netherlands are the most involved in publishing in journals that specialize in innovation research.

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Análisis bibliométrico de las universidades líderes en la investigación sobre Innovación

RESUMEN

Una de las disciplinas que ha mostrado mayor crecimiento en los últimos 25 años es la investigación científica sobre innovación bajo una perspectiva de gestión. El objetivo de este estudio es identificar las universidades más productivas e influyentes en la investigación sobre innovación. Las principales revistas en el campo también se estudian individualmente identificando las universidades más productivas en cada una de las revistas. Los datos obtenidos son de la Web of Science, filtrando primero por la palabra clave “innovation” entre los años de 1989 y 2013 y el segundo filtrado por dieciocho áreas de

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investigación de WoS relacionadas con la perspectiva de gestión. Nuestros resultados indican que las universidades de los Estados Unidos son las más productivas e influyentes, dado el mayor número de publicaciones que muestran mayores citas y mayor índice h. Sin embargo, ante los avances en la productividad de un gran número de revistas europeas, las universidades británicas y holandesas aparecen como las más implicadas en la publicación de revistas más especializadas en investigación sobre innovación.

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Introduction

Many scholars, especially in recent decades, have focused on innovation research, confirming a substantial growth in the discipline (Chen, Damanpour, & Reilly, 2010). This is demonstrated not only by the quantity of items published daily on the matter, but also by the number of new research centers that are appearing. These centers bring together specialists looking to evaluate deeper the explanatory factors of innovative business development (Cancino, Merigó, & Palacios-Marqués, 2015; Fagerberg, Fosaas, & Sapprasert, 2012).

Insofar as the number of publications on innovation continue to grow, it becomes necessary to investigate more about who the most productive and influential researchers are, and identify the major journals, and universities that are leading the development in this discipline. While some studies on this matter have been developed (Fagerberg et al., 2012; Linton,

2004; Shafique, 2013; Yang & Tao, 2012) not all explain which universities are investigating more on innovation.

In this paper we analyze deeper to identify the top 100 most influential and productive universities worldwide in innovation research, and at the same time analyze which universities are publishing most in journals specialized in innovation. To achieve this, we use bibliometric analysis (Broadus, 1987; Pritchard, 1969) in order to quantitatively analyze the bibliographic material developed by various universities in innovation research between 1989 and 2013. We obtained the data by considering all articles published in present academic journals in the Web of Science (WoS), first filtering by keyword innovation, second for the time period between 1989 and 2013, and third filtering by eighteen research areas of WoS related with managerial perspective, presenting the information with the university affiliation of the authors.

The results of the study show that USA and UK universities are the most productive and influential institutions

Table 1 – Most influential journals in innovation research.

R	Journal	R	Journal
1	Strategic Management J.	26	American Economic Review
2	Research Policy	27	Industrial and Corporate Change
3	Academy of Management J.	28	Technological Forecasting and Social Change
4	Organization Science	29	J. Operations Management
5	Management Science	30	J. Business Research
6	J. Product Innovation Management	31	Int. J. Industrial Organization
7	Academy of Management Review	32	Industrial Marketing Management
8	J. Marketing	33	Technology Analysis & Strategic Management
9	J. Business Venturing	34	J. Economic Geography
10	Technovation	35	Information & Management
11	Regional Studies	36	J. Engineering and Technology Management
12	Administrative Science Quarterly	37	Leadership Quarterly
13	J. Management Studies	38	Environment and Planning A
14	Harvard Business Review	39	Decision Sciences
15	R & D Management	40	Urban Studies
16	MIS Quarterly	41	J. Applied Psychology
17	MIT Sloan Management Review	42	World Development
18	California Management Review	43	Marketing Science
19	J. Management	44	J. Academy of Marketing Science
20	J. Int. Business Studies	45	Economic Journal
21	Small Business Economics	46	Cambridge J. Economics
22	RAND J. Economics	47	Review of Economics and Statistics
23	IEEE Trans. Engineering Management	48	Long Range Planning
24	Information Systems Research	49	J. Evolutionary Economics
25	Organization Studies	50	Economic Geography

The requirement to be considered in the ranking is to have at least 80 papers on innovation research and an h-index of 20.

Source: Based on Cancino et al. (2015).

in innovation research. In particular, American universities excel in the ranking representing more than eighty percent of the papers published on the subject. This is consistent with other rankings of the best universities in economics and business (QS, Shanghai ARWU). Also, the study analyzed the leading universities in seven specialized journals that are very influential in innovation research and some other leading management journals. While there are many European universities presenting an important advancement in the number of publications, particularly given that the establishment of European journals specializing in innovation research, American universities appear in the first places publishing in leading management journals. Clearly, the discipline of innovation is one that is drawing more interest among many researchers in the world, therefore explaining its rapid growth.

The rest of the article is as follows. “Literature review” section shows the literature review about innovation studies. Methods section briefly reviews the bibliometric methods. Results section presents the publication evolution by universities, the citation structure and the university analysis. Conclusions section summarizes the main findings and conclusions of the study.

Literature review

For many decades, bibliometric studies have been very common in literature, due to its state of art contribution in making certain areas of interest known. In order to understand the relevance of these studies, diverse definitions of the concept *bibliometrics* can be found. According to [Pritchard \(1969\)](#), it is a method of applying mathematics and statistics to the media of written communication in order to understand the nature and course of development of a discipline. Also, [Broadus \(1987\)](#) states that bibliometrics is the quantitative study of physically published units, or bibliographic units, or surrogates of either.

More simply [Norton \(2001\)](#) defines bibliometrics as the measurement of texts and information. Furthermore, in the last few years new uses have been given to bibliometrics. According to [Daim, Rueda, Martin, and Gerdri \(2006\)](#), it helps to explore, organize and analyze large amounts of historical data helping to identify *hidden patterns* that may help researchers in the decision making process.

Several disciplines on economics and management have used bibliometric studies, to either help us understand the data previously analyzed or show us possible hidden patterns that could be very interesting to address ([Bonilla, Merigó, & Torres-Abad, 2015](#); [Carvalho, Fleury, & Lopes, 2013](#); [Chun-Hao & Jian-Min, 2012](#); [Neely, 2005](#); [Wagstaff & Culyer, 2012](#)). Focusing on innovation research, and given that scholarly literature on innovation is now rapidly growing, it is possible to find some studies that have developed analysis through bibliometric methodologies ([Martin, 2012](#)). [Fagerberg and Verspagen \(2009\)](#) show that there are several thousand scholars worldwide that identify with innovation studies. The field has long passed the stage of an *invisible college* and now the field consists of a large number of groups of interacting scholars. In

Table 2 – List of top 7 journal in innovation research according TPI.

Abbreviation	Journal name
RP	Research Policy
IJTM	International Journal of Technology Management
TECH	Technovation
TFSC	Technological Forecasting and Social Change
JPIM	Journal of Product Innovation Management
TASM	Technology Analysis & Strategic Management
RDM	R&D Management

TPI = total number of publications in innovation research.

Source: Based on [Cancino et al. \(2015\)](#)

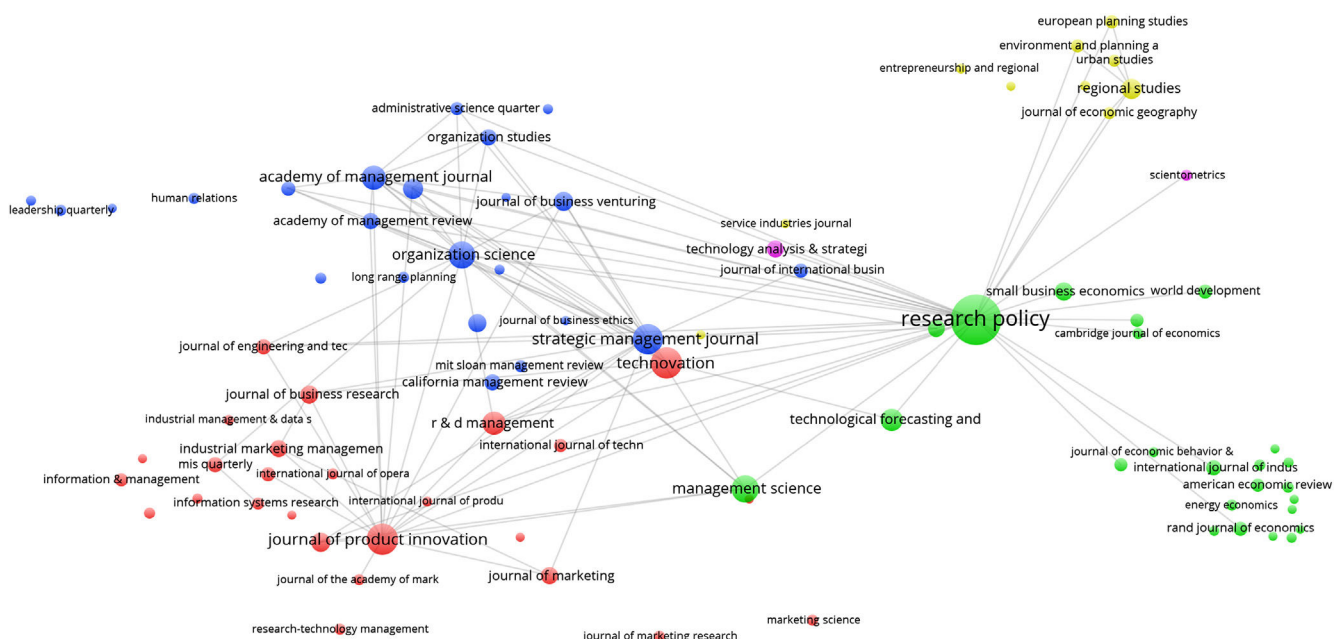


Fig. 1 – Bibliographic coupling between the most productive and influential journals in innovation research.

Table 3 – Most influential universities in innovation research.

R	Name	COU	HI	TCI	TPI	HI7	TCI7	TPI7	QS ranking	Shanghai ranking
1	U. Pennsylvania	USA	96	43 751	370	13	1379	20	MIT	Harvard U.
2	Harvard U.	USA	93	42 664	588	27	2925	47	U. Cambridge	Stanford U.
3	MIT	USA	76	25 169	395	31	4455	63	Imperial Coll. London	MIT
4	Stanford U.	USA	67	22 754	318	10	659	23	Harvard U.	U. Cal. Berkeley
5	U. Cal. Berkeley	USA	64	22 600	380	28	1439	36	U. Oxford	U. Cambridge
6	Columbia U.	USA	58	15 933	289	7	812	15	U. Coll. London	Princeton U.
7	U. Michigan	USA	58	11 251	260	21	2586	10	Stanford U.	California Inst. Tech.
8	U. Minnesota TC	USA	57	15 936	282	9	559	15	California Inst. Tech.	Columbia U.
9	U. Sussex	GBR	53	11 360	303	40	5537	130	Princeton U.	U. Chicago
10	Carnegie Mellon U.	USA	53	21 010	174	14	1205	22	Yale U.	U. Oxford
11	NYU	USA	53	10 744	254	9	620	16	U. Chicago	Yale U.
12	Michigan St. U.	USA	51	10 869	266	21	2586	43	Swiss Federal ITZ	UCLA
13	U. Maryland C. Park	USA	51	13 696	205	6	241	9	U. Pennsylvania	Cornell U.
14	UCLA	USA	49	7974	214	7	482	9	Columbia U.	U. California S. Diego
15	U. Southern Califor.	USA	49	8644	183	3	41	6	Johns Hopkins U.	U. Washington
16	London Bus Sch.	GBR	48	9211	160	13	1152	16	Kings Coll. London	U. Pennsylvania
17	U. Manchester	GBR	45	7917	410	31	3310	131	U. Edinburgh	Johns Hopkins U.
18	Rutgers St. U.	USA	45	8846	198	8	359	15	Ecole Polyt. F. Lausanne	U. California San Fran.
19	INSEAD	FRA	45	9576	124	10	280	15	Cornell U.	Swiss Federal ITZ
20	U. Texas at Austin	USA	45	9257	195	8	233	11	U. Toronto	U. Coll. London
21	Duke U.	USA	45	7653	206	5	270	7	McGill U.	U. Tokyo
22	Texas A&M U.	USA	45	9485	166	0	0	0	National U. Singapore	Imperial Coll. London
23	Erasmus U.	NLD	44	6581	329	22	1490	83	U. Michigan	U. Michigan
24	Arizona St. U.	USA	44	7681	212	7	488	15	Ecole Norm. Sup Paris	U. Toronto
25	Northwestern U.	USA	44	7427	179	5	334	8	Australian Nat. U.	U. WisconsinMadison
26	U.N.C. Chapel Hill.	USA	43	7511	183	9	304	11	Duke U.	Kyoto U.
27	Boston U.	USA	42	7088	177	11	928	18	U. Cal. Berkeley	NYU
28	U. Cambridge	GBR	41	7255	310	17	923	60	U. Hong Kong	Northwestern U.
29	Georgia Inst. Tech.	USA	41	6341	237	18	1053	58	U. Bristol	U. Illinois Urb. Cham.
30	U. Illinois Urb. Cham.	USA	41	6367	175	11	603	20	U. Manchester	U. Minnesota TC
31	London Sch. Eco. P. Sc.	GBR	41	6902	268	5	247	10	U. Tokyo	Duke U.
32	U. Oxford	GBR	40	6523	258	10	642	23	Seoul Nat. U.	Washington U. St. L.
33	Eindhoven U. Tech.	NLD	39	5290	222	33	3530	103	U. Melbourne	Rockefeller U.
34	Maastricht U.	NLD	39	6315	220	22	1957	53	Northwestern U.	U. Colorado Boulder
35	Rensselaer Poly. Inst.	USA	39	4751	151	22	2140	48	Ecole Polyt. Paris	Pierre&Marie Curie U.
36	Imperial C. London	GBR	39	5153	200	22	1490	45	Kyoto U.	U.N.C. Chapel Hill
37	Indiana U. Bloom.	USA	39	5950	215	8	233	13	UCLA	U. British Columbia
38	U. Washing. Tacoma	USA	38	6459	165	11	603	20	U. Sydney	U. Manchester
39	Emory U.	USA	38	6743	96	6	250	7	Nanyang Tech. U.	U. Texas at Austin
40	Cardiff U.	GBR	37	5177	228	13	833	25	Hong Kong U.	U. Copenhagen
41	Penn St. U.	USA	37	6390	208	7	184	17	NYU	U. California Sta. Barb.
42	U. Western Ontario	CAN	37	6928	114	4	140	7	U. Wisconsin-Madison	U. Paris Sud.
43	U. Utrecht	NLD	36	5015	238	20	1425	67	U. British Columbia	U. Maryland C. Park
44	U. Warwick	GBR	36	4582	226	19	801	43	U. Queensland	U. Melbourne
45	U. Toronto	CAN	36	6250	266	13	435	21	U. Copenhagen	U. Edinburgh
46	Case W. Reserve U.	USA	35	4968	98	9	805	13	Chinese U. Hong Kong	U. Texas SW Med. Cen.
47	Cornell U.	USA	35	4339	152	6	216	7	Tsinghua U.	Karolinska Institut.
48	U. Wisconsin Mad.	USA	35	7107	148	5	134	5	U. New South Wales	U. California Irvine
49	U. Chicago	USA	35	7608	166	2	407	4	Ruprecht Karls U.	Heidelberg U.
50	U. South Carolina	USA	35	5279	122	0	0	0	U. Amsterdam	U. Munich
51	Georgia St. U.	USA	35	6976	119	0	0	0	Korea Ad. Inst. Sc. Tec.	U. Southern California
52	Copenhagen Bus. Sch.	DNK	34	6151	201	18	1523	50	Ludwig-Maximilians U.	Rutgers U.
53	U. Amsterdam	NLD	34	5330	199	16	1649	31	Brown U.	Tech. U. Munich
54	U. Washing. Seattle	USA	34	6016	151	10	549	17	Technical U. Munich	Vanderbilt U.
55	KU Leuven	BEL	33	5144	222	20	1714	43	Osaka U.	U. California Davis
56	Nat. U. Singapore	SGP	33	4813	212	9	285	20	U. Glasgow	U. Zurich
57	U. Calif. Davis	USA	33	4160	137	6	272	12	Peking U.	Utrecht U.
58	Tel Aviv U.	ISR	33	5609	99	8	487	11	U. Zurich	Pennsylvania St. U.
59	Bocconi U.	ITA	33	3965	171	21	1609	9	U. Cal. San Diego	King's Coll. London
60	Tilburg U.	NLD	32	3750	215	14	704	41	Lund U.	Purdue U.
61	U. Nottingham	GBR	32	4090	225	15	1121	39	U. Warwick	Uppsala U.
62	U. Reading	GBR	32	3218	119	11	500	18	U.N.C. Chapel Hill	Carnegie Mellon U.
63	U. Virginia	USA	32	6983	112	8	431	14	U. Illinois Urb. Cham.	U. Bristol
64	McGill U.	CAN	32	3270	109	0	0	0	U. Birmingham	Ohio St. U.
65	Aalto U.	FIN	31	3638	176	14	602	45	U. Washington	U. Pittsburgh

Table 3 – (Continued)

R	Name	COU	HI	TCI	TPI	HI7	TCI7	TPI7	QS ranking	Shanghai ranking
66	U. Coll. London	GBR	31	3719	150	5	108	10	Carnegie Mellon U.	U. Geneva
67	U. British Columbia	CAN	31	5207	142	3	109	7	U. Helsinki	Ecole Norm. Sup Paris
68	McMaster U.	CAN	30	3319	108	17	1959	32	Tokyo Inst. Tech.	McGill U.
69	Vienna U. Eco. Bus.	AUT	30	2959	109	15	1497	25	U. Sheffield	U. Oslo
70	City U. Hong Kong	CHN	30	3456	144	14	891	21	Monash U.	Ghent U.
71	U. Illinois Chicago	USA	30	4268	111	9	418	16	Fudan U.	Hebrew U. Jerusalem
72	U. Sheffield	GBR	30	3275	120	5	102	9	London Sch. Eco. P. Sch.	Boston U.
73	Florida St. U.	USA	30	5791	128	4	130	5	Tohoku U.	U. Helsinki
74	Purdue U.	USA	30	3186	104	0	0	0	Trinity Coll. Dublin	Aarhus U.
75	U. Georgia	USA	29	2628	110	6	244	9	Leiden U.	Brown U.
76	Yale U.	USA	28	4998	109	6	539	8	National Taiwan U.	Australian Nat. U.
77	Ohio St. U.	USA	28	4282	151	5	68	6	U. Nottingham	Leiden U.
78	U. Arizona	USA	28	5944	98	3	45	4	Boston U.	Osaka U.
79	George Washing. U.	USA	27	3274	139	16	856	31	U. Texas at Austin	Stockholm U.
80	U. Melbourne	AUS	27	2632	152	10	491	19	Utrecht U.	Israel Inst. Tech.
81	Delft U. Tech.	NLD	26	2211	198	19	1096	73	Uppsala U.	U. Florida
82	U. Carlos III Madrid	ESP	26	2116	120	9	505	19	KU Leuven	Rice U.
83	Temple U.	USA	26	3142	130	9	257	17	U. Montréal	U. Groningen
84	Syracuse U.	USA	26	2262	103	9	410	13	U. Alberta	Moscow St. U.
85	Iowa St. U.	USA	26	2295	105	0	0	0	U. Geneva	U. Queensland
86	Polytechnic U. Milan	ITA	25	2625	161	20	1239	62	Delft U. Tech.	U. Arizona
87	U. Edinburgh	GBR	25	2559	140	15	746	39	Pohang U. Sc. Tech.	U. Utah
88	U. Quebec	CAN	25	2295	146	11	423	28	U. St Andrews	Arizona St. U.
89	George Mason U.	USA	25	2243	118	9	262	12	U. Western Australia	U. West. Australia
90	U. New South Wales	AUS	25	2404	113	7	545	8	U. Groningen	McMaster U.
91	U. Groningen	NLD	24	2372	156	14	652	42	Erasmus U.	U. Basel
92	Aston U.	GBR	24	2041	99	11	599	32	U. Auckland	U. Rochester
93	Cranfield U.	GBR	24	1972	111	15	784	31	Durham U.	U. Califor. Sta Cruz
94	Lund U.	SWE	24	2147	129	9	646	22	U. Southampton	U. Bonn
95	U. Bologna	ITA	24	2158	158	10	364	20	U. California Davis	U. Strasbourg
96	U. Montreal	CAN	24	2308	161	8	235	20	Aarhus U.	KU Leuven
97	Lancaster U.	BGR	24	2311	105	6	135	9	U. Leeds	Swiss Federal ITL
98	U. Hong Kong	CHN	24	1988	107	0	0	0	Queen Mary U. London	Texas A&M U.
99	Chalmers U. Tech.	SWE	23	1956	105	20	1614	58	Washington U. S. Louis	Georgia Inst. Tech.
100	VU U. Amsterdam	NLD	23	2119	164	12	402	34	U. Adelaide	VU U. Amsterdam

Abbreviations: R=Rank; COU=Country; HI=h-index (only in innovation research); TPI and TCI=total number of publications and citations (only in innovation research). Countries abbreviations (According to Codes – ISO 3166). QS ranking: QS world university rankings 2015. Shanghai ranking: Academic Ranking of World Universities – ARWU 2015.

this sense, they show that a core literature in innovation studies has emerged, centered around a small number of leading academics.

One of the most recent works about bibliometrics on innovation studies belongs to [Fagerberg et al. \(2012\)](#). Among its results, this paper shows that a sizeable quantity of literature on innovation has developed, mostly from the 1950s onwards, with a particularly strong growth in recent years. In which, it is possible to find three stages in the evolution of the field. The first stage, up to 1970, constitutes the early childhood of the studies on innovation, mainly focused on the study of economic and sociologic aspects, where there is a limited interaction with other fields. The second phase, after 1970 approximately, was developed through the work of a limited number of researchers from research centers in Stanford, Yale and Sussex ([Dosi, Malerba, Ramello, & Silva, 2006](#)). According to [Fagerberg et al. \(2012\)](#), a number of important contributions to the core literature emerged during the 1970s and 1980s that developed to shape the cognitive platforms of researchers in innovation for years to come. In this second phase, a distinctive characteristic of innovation studies was

a strong emphasis on multi and inter-disciplinarity, not only with regard to the social sciences, but also in relation to other parts of the scientific world such as engineering science. The third phase referred to by [Fagerberg et al. \(2012\)](#) is called the mature phase. In this phase, specialized professional associations were created and were involved in the development of innovation discipline (created in 1986; created in 1987). Among the most influential scholars in the discipline, there are outstanding works from (on the basis of their total contributions as assessed by the experts, adjusting for co-authorship): R. Nelson, C. Freeman, N. Rosenberg, J.A. Schumpeter, M. Porter, Z. Griliches, E. Von Hippel, B-A. Lundvall, K. Pavitt, A.D. Chandler, among others.

Finally, different studies on innovation are currently under development, which are addressing a variety of problems, the particularities of regions and its multidisciplinary nature ([Ball & Rigby, 2006](#); [Thieme, 2007](#); [Yang & Tao, 2012](#)). Some examples are those developed by [Seol and Park \(2008\)](#), who present an investigation of the knowledge sources of Korean innovation studies using citation analysis. At a country level, [Rafols, Leydesdorff, O'Hare1, Nightingale, and Stirling \(2012\)](#)

conducted a bibliometric study to compare the degree of interdisciplinarity and the research performance of a number of innovation study units with that of leading business and management schools in the UK. Also Linton (2004) identified the centers of active research on the management of technology and innovation through the use of a publication-based study. This paper determined that schools with capabilities in innovation research are distributed across the world. Yang and Tao (2012) investigated general topics that have been studied and identify as the most popular research topics in the field of innovation management. In particular, they developed a bibliometric analyses to find the world's top 10 innovation management universities.

With the aspiration of expanding on the previous studies, and increasing the number of universities studied, in this paper we hope to contribute to the literature analyzing the productivity and the influence of the top 100 universities that do the most research on innovation, analyzing not only the universities from USA, but also looking at universities throughout the world.

Methods

According to Broadus (1987), bibliometrics is a research field that quantitatively studies bibliographic material, providing a general overview of a research field according to a wide range of indicators (publications, citations,

h-index, etc.). Some studies focus on the number of publications, as this measures the author's or university's productivity (Trieschmann, Dennis, Northcraft, & Niemi, 2000). Podsakoff, MacKenzie, Podsakoff, and Bachrach (2008) argue that citation analysis is the optimal way of evaluating research because it measures the influence of a set of articles written by an author or a university. In addition, the *h*-index (Hirsch, 2005) is an indicator which combines articles with citations, indicating the number of studies *X* that have received *X* or more citations. For example, if a set of publications have an *h*-index of 10, inside the set, there are 10 articles that have received 10 citations or more; but there are not 11 studies or more with at least 11 citations.

Bibliometric studies – by means of number of publications, citation or *h*-index analysis – are becoming very popular in the literature, especially due to the development of specialized databases, such as Web of Science (WoS), which greatly facilitate the acquisition of research information (Merigó, Gil-Lafuente, & Yager, 2015).

The WoS is the database we used to collect the information on innovation research at universities. Currently, WoS includes more than 50,000,000 articles classified into roughly 250 categories and 150 research areas.

The information for this paper was collected between March and April of 2015. The data was obtained by considering all articles published in academic journals presently in WoS. We first filtered by keyword *innovation*, second by the time period of 1989–2013, third filtering by eighteen

Table 4 – Comparative analysis of leading universities according to different rankings.

R	Linton (2004) only US universities	Yang and Tao (2012)	This study by <i>h</i> -index	This study by total cites	This study by total publications
1	Rensselaer Poly. Ins.	U. Missouri-K.C.	U. Pennsylvania	U. Pennsylvania	Harvard U.
2	Rutgers St. U.	MIT	Harvard U.	Harvard U.	U. North Carolina
3	Georgia Inst. Tech.	Michigan St. U.	MIT	MIT	U. Manchester
4	Michigan St. U.	INSEAD	Stanford U.	Stanford U.	MIT
5	George Washing. U.	Harvard U.	U. Cal. Berkeley	U. Cal. Berkeley	U. Cal. Berkeley
6	Portland St. U.	U. Pennsylvania	Columbia U.	Carnegie Mellon U.	U. Pennsylvania
7	New Jersey In. Tech.	Northeastern U.	U. Michigan	U. Minnesota TC	Erasmus U.
8	Stanford U.	Texas A&M U.	U. Minnesota TC	Columbia U.	Stanford U.
9	Harvard U.	Stanford U.	U. North Carolina	U. Maryland C. Park	U. Cambridge
10	North Carolina St. U.	Delft U. Tech.	U. Sussex	U. North Carolina	U. Sussex
11	U. New Mexico, A. Sch.	Temple U.	Carnegie Mellon U.	U. Sussex	Columbia U.
12	Stevens Ins. Tech.	U. Michigan	NYU	U. Michigan	U. Minnesota TC
13	Washington U.	Carnegie Mellon U.	Michigan St. U.	Michigan St. U.	London Sch. Eco. Pol. Sc.
14	U. Michigan	Duke U.	U. Maryland C. Park	NYU	Michigan St. U.
15	U. Pennsylvania	Arizona St. U.	UCLA	INSEAD	U. Toronto
16	Drexel U.	U. Illinois Urb. Cham.	U. Southern Calif.	Texas A&M U.	U. Illinois Urb. Cham.
17	U. Minnesota TC	U.N.C. Chapel Hill.	London Bus Sch.	U. Texas at Austin	U. Michigan
18	U. Massachusetts	U. Utah	U. Manchester	London Bus Sch.	U. Oxford
19	Temple U.	London Bus. Sch.	Rutgers St. U.	Rutgers St. U.	NYU
20	U. Illinois Urb. Cham.	Rensselaer Poly. Ins.	INSEAD	U. Southern Calif.	U. Utrecht
21	U. Dayton	Boston U.	U. Texas at Austin	UCLA	Georgia Inst. Tech.
22	U. Tennessee	Erasmus U.	Duke U.	U. Manchester	Cardiff U.
23	Louisiana Tech. U.	Georgia Inst. Tech.	U. Illinois Urb. Cham.	Arizona St. U.	U. Warwick
24	U.N.C. Chapel Hill.	U. Texas at Austin	Texas A&M U.	Duke U.	U. Nottingham
25	Wayne St. U.	China Europe B. Sch.	Erasmus U.	U. Chicago	Eindhoven U. Tech.
26	Syracuse U.	Columbia U.	Arizona St. U.	U.N.C. Chapel Hill.	KU Leuven
27	Lehigh U.	NYU	Northwestern U.	U. Illinois Urb. Cham.	Maastricht U.
28	Indiana U.	North Carolina St. U.	U.N.C. Chapel Hill.	Northwestern U.	Indiana U. Bloom.
29	U. Denver	Clarkson U.	Boston U.	U. Cambridge	Tilburg U.
30	Southern Illinois U.	Purdue U.	U. Cambridge	U. Wisconsin Mad.	UCLA

research areas of WoS related with managerial perspective (Business & Economics, Public Administration, Government & Law, Geography, Urban Studies, Area Studies, Sociology, History and Philosophy of Science, Social Work, Social Issues, Behavioral Sciences, Asian Studies, Social Sciences and Other Topics, Transportation, Operations Research & Management Science, and Computer Science), and presented the information according to university affiliation of the authors of each article. According to Cancino et al. (2015) there are many journals that publish papers in innovation research. Table 1 presents a list with the fifty journals with the highest *h*-index in innovation research.

If we analyze the citation structure of the most productive and influential innovation research journals using bibliographic coupling (Martyn, 1964) methodology (see Fig. 1), we can see that Research Policy, Strategic Management Journal, Technovation, Journal of Product Innovation Management and Organization Science are the most relevant journals with a very huge bibliographic network. The most productive journals have the highest influence in the analysis because they

have more articles and therefore they also generate more citations. By defining the top 100 universities that publish the most about innovation topics in present journals in WoS we came up with 18 806 articles published between 1989 and 2013, comprising a total of 716 955 citations.

Moreover, the study takes into consideration the analysis of publications, citations and *h*-index of the top 100 universities mentioned above, in relation to that which was published in the 7 journals most specialized in innovation research (see Table 2). These specialized journals are characterized by having more than 90% of papers published in them dealing with innovation topics. This will not only allow us to identify the most influential universities in this field but also those that are publishing most about innovation research.

Results

This section presents the results of the paper. First, the study analyzed the leading research universities in innovation from

Table 5 – Most influential universities in innovation research between 1989 and 1993.

R	University	TPI	TCI	HI	TCI/TPI	% PI	>250	>100	>50	TP	HG
1	U. Pennsylvania	34	16 261	25	478.26	0.002	7	17	22	21 207	300
2	Harvard U.	39	6722	25	172.36	0.001	6	10	19	37 237	545
3	MIT	45	4803	20	106.73	0.003	4	9	14	15 763	362
4	Columbia U.	20	3629	17	181.45	0.001	4	7	11	17 914	321
5	U. Cal. Berkeley	32	3194	16	99.81	0.001	2	6	9	21 836	331
6	UCLA	24	1327	16	55.29	0.001	0	5	6	28 557	337
7	Tel Aviv U.	19	1959	14	103.11	0.002	3	3	9	9380	160
8	U. Sussex	20	1651	14	82.55	0.007	2	6	7	2899	120
9	Northwestern U.	16	756	14	47.25	0.002	0	1	5	9641	238
10	Georgetown U	7	113	14	16.14	0.001	0	0	1	4736	165
11	U. Michigan	15	1137	12	75.80	0.001	0	4	9	19 093	317
12	U. Texas at Austin	16	857	12	53.56	0.002	1	1	6	10 121	219
13	U. Minnesota TC	18	2154	11	119.67	0.001	1	5	7	18 523	289
14	Carnegie Mellon U.	15	9525	10	635.00	0.004	2	4	6	3961	184
15	Stanford U.	15	2642	10	176.13	0.001	2	5	7	17 318	381
16	NYU	11	1286	9	116.91	0.001	1	2	5	8716	257
17	Duke U.	11	723	10	65.73	0.001	1	2	3	11 472	296
18	Boston U.	13	426	10	32.77	0.002	0	1	2	6874	214
19	U. California Irvine	10	780	8	78.00	0.001	1	1	1	6886	207
20	Newcastle U.	8	249	8	31.13	0.002	0	0	2	5074	131
21	Princeton U.	8	2479	7	309.88	0.001	3	3	6	6857	252
22	Texas A&M U.	11	1510	7	137.27	0.001	1	4	6	9633	178
23	U. Oxford	9	616	7	68.44	0.001	1	1	3	16 420	292
24	U. British Columbia	11	498	7	45.27	0.001	0	3	4	12 595	221
25	U. Chicago	10	493	7	49.30	0.001	0	2	4	15 397	306
26	U. Southern California	13	491	7	37.77	0.001	0	1	4	11 036	242
27	McMaster U.	10	471	7	47.10	0.001	0	2	2	7041	191
28	U. Amsterdam	10	396	7	39.60	0.001	0	2	3	7026	184
29	U. Montreal	12	268	7	22.33	0.001	0	1	1	8691	177
30	U. Manchester	11	253	7	23.00	0.001	0	0	2	10 261	168
31	Indiana U. Bloom.	15	208	7	13.87	0.003	0	0	2	5492	167
32	Yale U.	9	1543	6	171.44	0.001	0	2	3	13 949	332
33	Maastricht U.	10	842	6	84.20	0.004	1	1	2	2489	123
34	Penn State U.	9	357	6	39.67	0.001	0	2	2	12 290	230
35	Case Western Res. U.	10	300	6	30.00	0.001	0	1	2	7469	203
36	Arizona St. U.	7	246	6	35.14	0.001	0	0	1	5255	151
37	Cornell U.	8	133	6	16.63	0.000	0	0	1	18 532	313
38	Carleton U.	9	87	6	9.67	0.004	0	0	0	2184	88
39	U. Arizona	10	509	5	50.90	0.001	0	2	3	11 336	225
40	Southern Methodist U.	8	303	5	37.88	0.007	0	0	3	1139	83

1989 to 2013 followed by the most productive universities based on publication in the top-7 innovation research journals. Second, the paper presented an analysis of leading universities by comparing the results obtained from previous studies. Third, the article analyzed the most influential universities in innovation research by periods of time. Fourth, the study presented a bibliographic coupling and co-authorship analysis between the most productive and influential universities in innovation research. Finally, the study analyze the leading universities in seven specialized journals that are very influential in innovation research and some other leading management journals.

Leading universities in innovation research

There are many universities publishing papers about innovation research. Among them all, within the period of 1989–2013, we can single out the most important in terms of their *h*-index (HI), the most productive in terms of the total number of papers published on the subject (TPI), and finally the

most influential universities based on the total citations their publications are receiving (TCI).

Table 3 shows three important analysis to consider: 1) presents the HI, TCI and TPI indicators for the 100 universities with the highest *h*-index in innovation research; 2) presents HI7, TCI7 and TPI7 indicators for the 100 universities that publish in the 7 journals specialized in innovation research (see Table 2); and Table 3) compares the ranking of universities on their productivity in innovation research in relation to two other international rankings of universities: QS and Shanghai Ranking.

As can be seen in Table 3, the most influential institutions worldwide are mainly American, accompanied by some of the most prestigious universities in the UK. In fact, 54% of the top 100 universities are located in USA, 16% in UK, 8% in Netherlands, and 7% in Canada. The rest of the universities are mainly in Europe, with particular exceptions being the universities of Singapore, Israel and China.

If we look at the top 10 leading universities in the theme, ninety percent are American institutions, with the University

Table 6 – Most influential universities in innovation research between 1994 and 1998.

R	University	TPI	TCI	HI	TCI/TPI	% PI	>250	>100	>50	TP	HG
1	U. Pennsylvania	70	11680	46	166.86	0.35	13	34	45	19858	354
2	Harvard U.	74	14853	37	200.72	0.15	12	23	34	48205	623
3	MIT	66	8124	37	123.09	0.43	10	20	33	15257	392
4	Stanford U.	48	8418	27	175.38	0.24	12	18	26	19872	415
5	U. Cal. Berkeley	45	9568	26	212.62	0.22	7	13	19	20330	359
6	Michigan St. U.	45	3503	26	77.84	0.49	4	10	13	9213	224
7	Columbia U.	42	4142	25	98.62	0.26	6	10	18	16218	368
8	NYU	40	2730	25	68.25	0.39	1	9	17	10258	272
9	Carnegie Mellon U.	35	5034	24	143.83	0.75	5	15	20	4674	198
10	U. Michigan	39	3103	23	79.56	0.17	2	8	16	22473	356
11	U. Southern Calif.	36	3478	22	96.61	0.31	4	8	15	11636	266
12	U. Sussex	44	2337	20	53.11	1.20	1	7	13	3660	143
13	UCLA	38	2218	19	58.37	0.16	3	7	13	23117	363
14	U. Manchester	46	1429	19	31.07	0.34	1	3	9	13663	210
15	U. Minnesota TC	28	1914	18	68.36	0.14	1	4	11	20079	323
16	London Bus Sch	21	2505	17	119.29	6.48	1	4	10	324	54
17	U. Warwick	28	720	17	25.71	0.77	0	0	1	3636	112
18	U. Wiscon. Madison	24	2505	16	104.38	0.13	5	9	10	18767	303
19	Florida St. U.	24	2432	16	101.33	0.44	3	4	9	5457	138
20	Northwestern U.	27	2310	16	85.56	0.23	3	5	9	11780	274
21	U.N.C. Chapel Hill.	21	2077	16	98.90	0.16	2	5	7	12836	299
22	U. South Car. Col.	24	807	16	33.63	0.65	0	2	5	3700	138
23	Texas A&M U.	19	3308	15	174.11	0.17	5	8	10	11101	199
24	U. Illinois Urb. Cham.	26	2117	15	81.42	0.18	3	7	8	14342	262
25	U. Cal. San Diego	18	2274	14	126.33	0.11	3	4	5	16334	367
26	U. Texas Austin	20	2110	14	105.50	0.19	3	5	9	10440	217
27	U. Oxford	23	1312	14	57.04	0.11	1	5	8	21351	339
28	U. Cambridge	26	895	14	34.42	0.11	0	2	6	23657	347
29	U. British Columbia	24	1883	13	78.46	0.17	3	3	5	14558	248
30	South. Methodist U.	18	1509	13	83.83	1.10	2	4	6	1644	96
31	Boston U.	19	1319	13	69.42	0.22	0	7	8	8823	256
32	Polytechnic U Milan	21	680	13	32.38	0.80	0	2	4	2614	83
33	Cardiff U.	34	1534	12	45.12	0.47	2	3	4	7242	163
34	U. Toronto	18	1380	12	76.67	0.07	2	4	4	25326	354
35	Iowa St. U.	18	1016	12	56.44	0.25	0	4	8	7352	170
36	U. College London	18	719	12	39.94	0.08	0	1	7	23105	333
37	U. Maryland C. Park	22	1228	11	55.82	0.22	1	3	6	10011	209
38	U. Georgia	19	776	11	40.84	0.23	1	1	4	8395	167
39	U. Edinburgh	20	579	11	28.95	0.17	0	1	4	11561	239
40	U. Libre de Bruxelles	19	713	10	37.53	0.23	0	2	5	8129	182

of Sussex standing out as the only British university appearing at the top.

When we advance in our analysis to the top 20 leaders in innovation research universities, American institutions maintain a high percentage, with 16 of the 20 listed. With this group of universities 3 are now from the UK and 1 from France.

Of the top 50 universities in the ranking it can be seen that 34 are USA universities, followed by 9 from the UK, 4 from the Netherlands, 2 from Canada and finally 1 from France.

As for the number of citations, the first 26 ranking universities accumulate the same number of citations as the rest of the universities ranking, which explains the high impact it has on innovation research. However, in as much as productivity is concerned, only the sum of what was published in the first 40 universities equals the sum of that which is published by the rest of the universities. This implies that while the top universities are very influential in the field in terms of research innovation, they are not necessarily the ones

publishing more articles on innovation research. Distinctive cases are certain universities in the UK and Netherlands such as U. Manchester, U. Cambridge and Erasmus U. Rotterdam, which although being highly productive, do not necessarily have the highest *h*-index. This may be because there are many, mainly European journals, that have specialized in innovation research and which publish numerous articles from mainly European universities.

If we analyze the information HI7, TCI7 and TPI7, referring to that published by the universities in the ranking and the 7 journals most specialized in innovation research (see Table 2), we see that the top 15 American universities, which are also part of the first in the ranking, represent only 15% of what is published in seven specialized journals and 25% of the citations in the same journals. This implies that as far as at the level of journals specialized in innovation research, the influence of American universities is not as strong as it is at the level of a global journal, with the universities in the

Table 7 – Most influential universities in innovation research between 1999 and 2003.

R	University	TPI	TCI	HI	TCI/TPI	% PI	>250	>100	>50	TP	HG
1	Harvard U.	127	12 378	51	97.46	0.23	13	35	51	55 975	627
2	U. Pennsylvania	81	11 732	44	144.84	0.35	16	30	41	23 101	360
3	MIT	77	7353	44	95.49	0.46	8	23	40	16 900	407
4	U. Cal. Berkeley	75	4355	36	58.07	0.33	2	11	25	22 573	383
5	Columbia U.	54	5688	34	105.33	0.28	6	17	29	19 403	364
6	U. Maryland C. Park	52	9162	32	176.19	0.46	3	18	27	11 281	245
7	INSEAD Bus Sch	49	6497	32	132.59	13.28	3	13	23	369	82
8	Stanford U.	66	6805	31	103.11	0.29	3	14	23	22 693	438
9	U. Minnesota TC	49	7995	30	163.16	0.24	8	13	22	20 839	318
10	Michigan St. U.	50	4341	29	86.82	0.48	3	16	23	10 415	233
11	U.N.C. Chapel Hill.	43	3392	28	78.88	0.29	3	14	20	14 637	296
12	U. Sussex	60	3161	28	52.68	1.59	5	10	16	3778	159
13	U. Michigan	53	3362	27	63.43	0.22	1	9	18	24 131	364
14	U. Manchester	84	2519	27	29.99	0.55	1	5	14	15 314	224
15	U. Cambridge	52	2932	26	56.38	0.20	1	8	15	25 790	368
16	Erasmus U.	53	2023	26	38.17	0.65	1	4	15	8155	238
17	Carnegie Mellon U.	38	5077	25	133.61	0.68	6	15	19	5572	204
18	Arizona St. U.	36	4511	25	125.31	0.53	6	14	19	6852	190
19	U. Texas Austin	44	4462	24	101.41	0.39	6	12	17	11 304	238
20	NYU	47	3391	24	72.15	0.38	4	12	18	12 537	300
21	U. Washing. Seattle	26	1978	22	76.08	0.11	0	8	11	24 786	400
22	Indiana U. Bloom.	41	2145	24	52.32	0.67	1	8	12	6166	184
23	U. Warwick	46	1881	24	40.89	1.00	0	4	8	4586	136
24	Boston U.	31	3047	23	98.29	0.29	3	13	17	10 788	284
25	Duke U.	34	3092	22	90.94	0.21	2	6	9	16 067	338
26	U. Nottingham	43	1393	22	32.40	0.44	1	1	8	9812	194
27	Georgia St. U.	35	4405	21	125.86	1.21	3	9	12	2898	115
28	UCLA	41	1581	21	38.56	0.16	0	6	10	25 882	376
29	Nat. U. Singapore	37	1562	21	42.22	0.31	1	3	8	11 833	175
30	Eindhoven U. Tech.	35	1230	21	35.14	0.91	0	3	7	3848	129
31	Maastricht U.	43	1430	20	33.26	0.82	1	2	9	5255	178
32	U. Wiscon. Madison	33	3015	19	91.36	0.17	2	5	8	19 817	317
33	U. Chicago	32	2857	19	89.28	0.18	4	8	10	18 087	335
34	U. Oxford	37	2115	19	57.16	0.16	1	6	11	23 753	365
35	Ohio St. U.	32	1673	19	52.28	0.19	1	6	8	16 584	268
36	George Washin. U.	38	1143	19	30.08	0.84	1	2	7	4507	162
37	Penn St. U.	39	2724	18	69.85	0.22	2	6	14	17 397	276
38	U. California Davis	33	1773	17	53.73	0.20	2	7	9	16 643	269
39	Cardiff U.	49	1232	17	25.14	0.57	0	4	6	8563	191
40	U. Illinois Urb. Cham.	33	1868	16	56.61	0.22	2	6	11	15 054	258

Table 8 – Most influential universities in innovation research between 2004 and 2008.

R	University	TPI	TCI	HI	TCI/TPI	% PI	>250	>100	>50	TP	HG
1	Harvard U.	155	8556	54	55.20	0.22	5	21	58	71 394	571
2	U. Pennsylvania	98	4861	41	49.60	0.34	0	16	37	28 812	338
3	MIT	97	4716	38	48.62	0.46	2	15	31	21 101	394
4	U. Minnesota TC	81	3567	35	44.04	0.33	2	8	23	24 913	282
5	U. Cal. Berkeley	101	4739	33	46.92	0.39	2	10	23	25 959	351
6	Stanford U.	71	4754	32	66.96	0.25	3	14	22	28 072	378
7	London Bus. Sch.	56	3516	32	62.79	11.74	1	13	26	477	74
8	Erasmus U.	88	2932	31	28.71	0.71	1	4	20	12 370	233
9	U. Manchester	99	2842	31	33.32	0.50	2	2	16	19 787	241
10	U. Sussex	72	3534	30	49.08	1.41	1	13	23	5125	135
11	Imperial C. London	69	3195	30	46.30	0.25	1	6	18	27 295	303
12	U. Michigan	73	3493	29	47.85	0.23	1	12	20	31 568	339
13	Eindhoven U. Tech.	88	3412	29	38.77	1.59	2	6	21	5539	131
14	NYU	66	2985	29	45.23	0.42	2	9	16	15 663	262
15	Indiana U. Bloom.	55	2868	29	52.15	0.71	2	8	15	7708	168
16	Duke U.	68	2552	29	37.53	0.32	0	6	18	21 379	320
17	Georgia Inst. Tech.	64	3111	27	48.61	0.58	2	7	18	10 967	215
18	KU Leuven	65	2585	27	39.77	0.35	1	7	12	18 569	245
19	U. Toronto	80	2565	27	32.06	0.21	0	5	14	38 311	341
20	Arizona St. U.	61	2320	27	38.03	0.63	1	4	17	9628	187
21	U. Maryland C. Park	53	2915	26	55.00	0.39	2	9	16	13 722	221
22	Michigan St. U.	58	2549	26	43.95	0.43	2	4	15	13 412	206
23	UCLA	57	2372	26	41.61	0.18	0	6	16	31 335	358
24	Maastricht U.	54	2168	26	40.15	0.69	0	4	13	7856	177
25	Cardiff U.	66	1830	26	27.73	0.65	0	1	12	10 096	174
26	Texas A&M U.	50	1661	26	33.22	0.33	0	1	13	15 105	186
27	U. Utrecht	61	2916	25	36.64	0.34	2	7	15	17 917	242
28	Columbia U.	64	2345	25	47.80	0.25	1	4	14	25 845	334
29	U. Cambridge	67	2031	24	30.31	0.23	1	2	10	29 179	338
30	Cornell U.	52	2261	23	26.44	0.22	3	4	12	23 643	302
31	Penn St. U.	57	1507	23	43.48	0.27	0	2	10	21 143	263
32	U. Oxford	63	1986	22	31.52	0.22	1	5	12	28 286	335
33	U. Nottingham	66	1834	22	27.79	0.55	0	3	10	11 907	189
34	U. Texas at Austin	48	1540	22	32.08	0.33	0	3	10	14 634	219
35	Bocconi U.	48	1412	22	29.42	8.96	0	3	7	536	53
36	Nat. U. Singapore	65	2335	21	35.92	0.36	3	5	8	17 868	204
37	Boston U.	47	1822	21	38.77	0.35	1	3	9	13 572	259
38	U. Warwick	51	1536	21	30.12	0.77	1	2	6	6668	136
39	Aalto U.	58	1285	21	22.16	1.25	0	1	5	4639	104
40	Copenhagen Bus. Sch.	49	3259	20	66.51	0.26	2	7	12	18 915	253

UK and Netherlands being the most influential in specialized journals.

In [Table 3](#) the last two columns show two of the most famous university rankings which rank according to various indicators. For example, the QS Ranking column shows the list of the 2015 QS World University Rankings. Likewise, the last column in [Table 3](#) shows the Shanghai Ranking, also known as the Academic Ranking of World Universities – ARWU. The ranking of universities in this paper has some similarities as well as a few differences with the QS and Shanghai rankings. In terms of similarities, we see that the top 20 universities in innovation research also appear in important positions in the other two rankings. The most prestigious universities in the world, particularly located in the USA, are usually present in all of the university rankings. Even though they might not necessarily occupy the same location in the rankings, they still appear at the top. As for the differences, we see that after this group of highly recognized universities, QS and Shanghai rankings tend to look less like that presented in this paper. This is evident when we see that 50% of the present universities in Shanghai Ranking do not appear in our Innovation

Research Ranking. In the case of QS Ranking 46% of universities do not appear. This may be due to the methodology used for selecting the universities, which in the case of ranking for this paper depends on the highest *h*-index, which is calculated by the papers published on innovation research by each university.

Comparative analysis of leading universities according to different rankings

Even though they use different methodologies, at least two other rankings of the influence of universities on innovation research can be found in the literature. The following [Table 4](#) shows a comparison of the top 30 universities of each ranking as developed by [Linton \(2004\)](#) and [Yang and Tao \(2012\)](#) in relation to those presented in this paper (sorted by HI, TCI and TPI).

In general the results of our rankings, be they for the *h*-index, TCI or TPI, are more similar to [Yang and Tao's list \(2012\)](#) in comparison to [Linton's list \(2004\)](#). The first set coincides in two thirds of the institutions classified, while the second only

Table 9 – Most influential universities in innovation research between 2009 and 2013.

R	University	TPI	TCI	HI	TCI/TPI	% PI	>250	>100	>50	TP	HG
1	Harvard U.	207	2974	27	14.37	0.22	0	4	16	95 103	384
2	U. Utrecht	150	1912	22	12.75	0.61	0	1	9	24 725	174
3	Erasmus U.	164	1795	22	10.95	0.91	0	2	6	18 034	171
4	U. Pennsylvania	91	1553	22	17.07	0.26	0	4	6	35 690	235
5	MIT	120	1531	22	12.76	0.44	0	0	7	27 107	283
6	Imperial C. London	99	1426	22	14.40	0.30	0	1	7	33 011	215
7	U. Michigan	87	1271	22	14.61	0.21	0	0	5	41 269	219
8	U. Cal. Berkeley	128	2159	21	16.87	0.39	1	5	9	33 162	249
9	Stanford U.	121	1751	21	14.47	0.34	0	2	9	35 648	256
10	U. Cambridge	159	1662	21	10.45	0.43	0	2	2	36 671	236
11	U. Sussex	123	1545	21	12.56	1.80	0	3	8	6835	92
12	U. Minnesota TC	109	1417	20	13.00	0.36	0	2	6	30 432	191
13	Maastricht U.	102	1219	20	11.95	0.86	0	1	3	11 877	130
14	Georgia Inst. Tech.	126	1467	19	11.64	0.91	0	2	7	13 871	130
15	Bocconi U.	131	1397	19	10.66	12.51	0	0	5	1047	36
16	Copenhagen B. Sch	123	1336	19	10.86	12.04	0	2	4	1022	34
17	U. Amsterdam	108	1272	19	11.78	0.51	0	2	4	21 094	163
18	U. Toronto	133	1199	19	9.02	0.26	0	0	2	51 977	249
19	U. Nottingham	109	1076	19	9.87	0.69	0	0	2	15 894	129
20	KU Leuven	126	1069	19	8.48	0.43	0	0	0	29 218	177
21	NYU	91	1061	18	11.66	0.43	0	1	4	21 129	184
22	Tilburg U.	114	988	18	8.67	2.89	0	0	0	3941	54
23	Indiana U. Bloom.	96	975	18	10.16	1.00	0	1	1	9572	118
24	U. Manchester	185	1413	17	7.64	0.75	0	1	2	24 595	171
25	Arizona St. U.	96	1143	17	11.91	0.73	1	1	3	13 204	116
26	Columbia U.	115	1041	17	9.05	0.35	0	1	2	32 754	219
27	U. Warwick	98	988	17	10.08	0.97	0	0	3	10 115	107
28	Michigan St. U.	106	904	17	8.53	0.61	0	0	1	17 301	130
29	Eindhoven U. Tech.	95	1047	16	11.02	1.33	0	1	4	7142	87
30	Cardiff U.	86	812	16	9.44	0.69	0	0	2	12 414	128
31	U. Oxford	129	976	15	7.57	0.32	0	0	1	39 768	247
32	Seoul National U.	113	823	15	7.28	0.28	0	0	2	39 996	147
33	Aalto U.	85	809	15	9.52	1.32	0	1	3	6422	81
34	U. Groningen	89	775	15	8.71	0.43	0	1	3	20 689	159
35	VU U. Amsterdam	94	707	15	7.52	0.49	0	0	0	19 080	155
36	Penn St. U.	91	707	13	7.77	0.36	0	0	3	25 092	156
37	Nat. U. Singapore	99	633	13	6.39	0.39	0	0	1	25 676	161
38	Polytechnic U. Milan	89	575	13	6.46	1.31	0	0	0	6814	77
39	Delft U. Technology	110	575	12	5.23	1.06	0	0	0	10 390	95
40	U Politec. Valencia	102	546	11	5.35	1.48	0	0	3	6884	77

matches with one in three universities in the list. As is to be expected to observe, in both cases there is no relationship in the position each university takes in the ranking. This may be due to several reasons. First, the work of Linton (2004) is much older than that of Yang and Tao, and in nearly 10 years, many universities have increased their efforts in publishing in areas of innovation. The rotation in the top 30 is also much higher. Second, Linton's list (2004) only considers American universities, leaving out of the ranking a number of internationally renowned universities, mainly from the UK and Netherlands. In this sense, it can be noted that the Yang and Tao's list is much more complete in classifying the top 30 research universities in innovation, as it assesses universities from around the world, without focusing solely on the US universities. Thus our rankings match best.

Leading universities in innovation research by periods of time

In this section, let us focus on the evolution of leading universities in innovation research throughout time. For doing so, the

study considers periods of five years between 1989 and 2013. In each period, a list with the universities that has published the highest number of articles in innovation is presented. The analysis uses similar indicators than Table 3. Tables 5–9 present the results.

Again, we can see that American universities are those that appear on the list of leading institutions in innovation research in the five periods described. Pennsylvania U., Harvard U. and MIT have been the main leaders during the last twenty-five years. Nevertheless, in recent years it is possible to see how other universities, other than those from the USA, have developed a significant increase in the number of publications in innovation research. It is noteworthy that in the first quinquennium analyzed, 1989–1993, only 9 universities are not from the USA. Furthermore, the periods between 1994–1998, 1999–2003 and 2004–2008, 11, 12 and 18 universities respectively, are neither from the USA. Finally, in the period 2009–2013, a total of 40 universities with the highest number of publications on innovation, 24 are not from the United States. That is because in this last period, only 40% of universities leading publications in innovation come

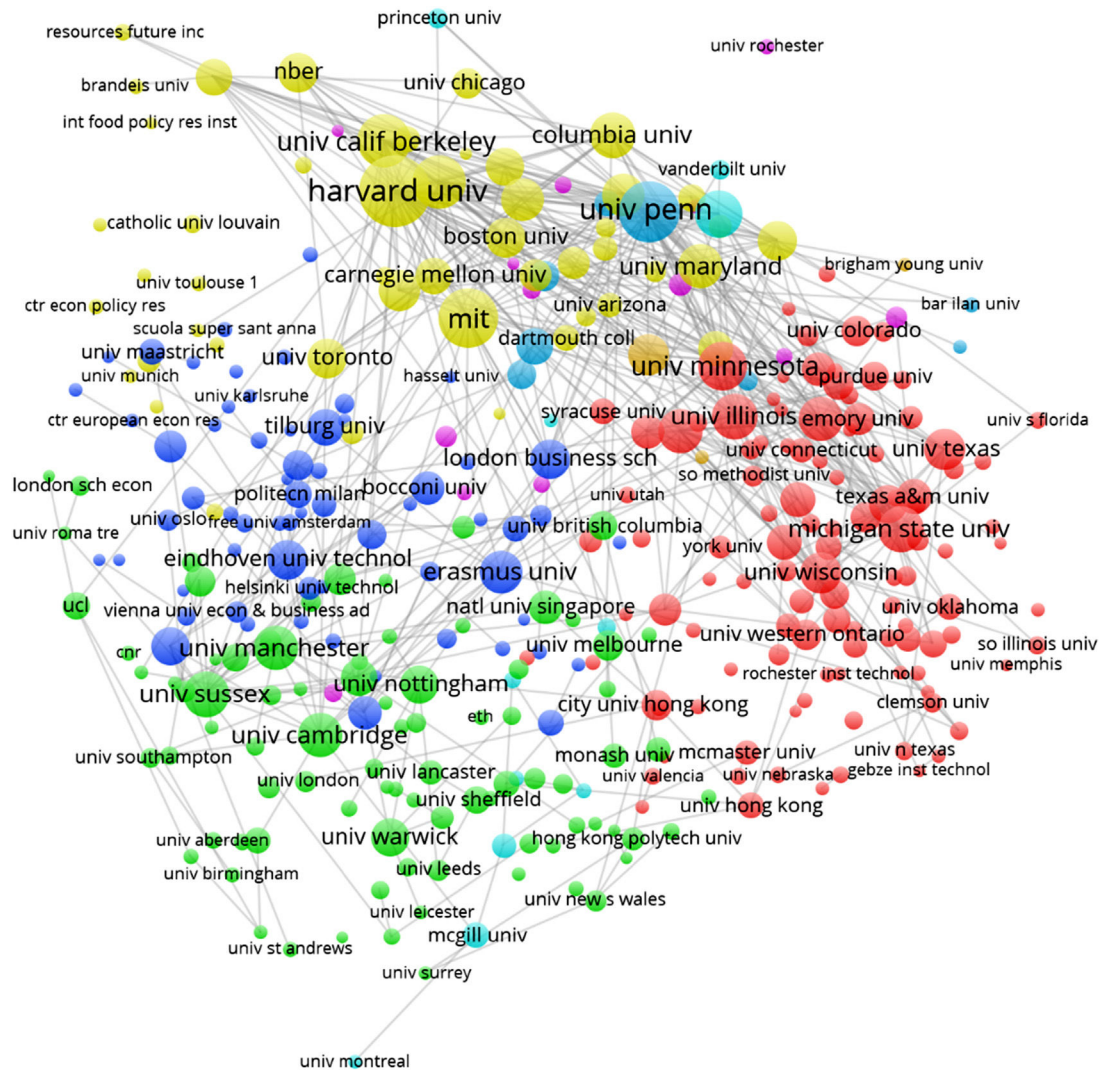


Fig. 2 – Bibliographic coupling between the most productive and influential universities in innovation research.

from the USA, different than nearly 80% in the 1989–1993 period. Without doubt, the increased participation of universities, mainly European, from the UK and the Netherlands, which contain a high number of publications is due to the greater number of scientific journals that have focused on the study of innovation research, possibly allowing a higher number of scientists across the world can to publish their work in these journals, many of which are European.

This allows us to understand the progress universities outside the US have had, as the largest number of research publications in developing innovation. Nevertheless, this greater productivity is not necessarily associated with greater influence in the scientific realm, where universities from the USA continue to excel.

Bibliographic coupling and co-citation between the most productive and influential universities in innovation research

Finally, the study presents an analysis about the citation structure of innovation research by universities through the

concepts of bibliographic coupling and co-citation. While, bibliographic coupling appears when two different studies reference a common third study in their bibliographies (Martyn, 1964), co-citation measures the frequency with which two documents are cited together by other documents (Small, 1973).

On the one hand, Fig. 2 shows the bibliographic coupling between the most productive and influential universities in innovation research.

Both, American and European universities, show important influence in the analysis because they publish more articles and therefore they also generate more citations. It is possible to observe the existence of several groups of universities bibliographically coupled, presenting a very huge bibliographic network. For example, Harvard U., U. Columbia, MIT, U. California Berkeley, and Boston U. can be called a premium network of American universities. A second group of American universities can be associated with U. Texas-Austin, Texas A&M U., Michigan St. U., U. Wisconsin, and U. Minnesota, which are bibliographically coupled as well. In the context of European universities, it is possible to find another two groups. The first one, related only with UK universities, including U.

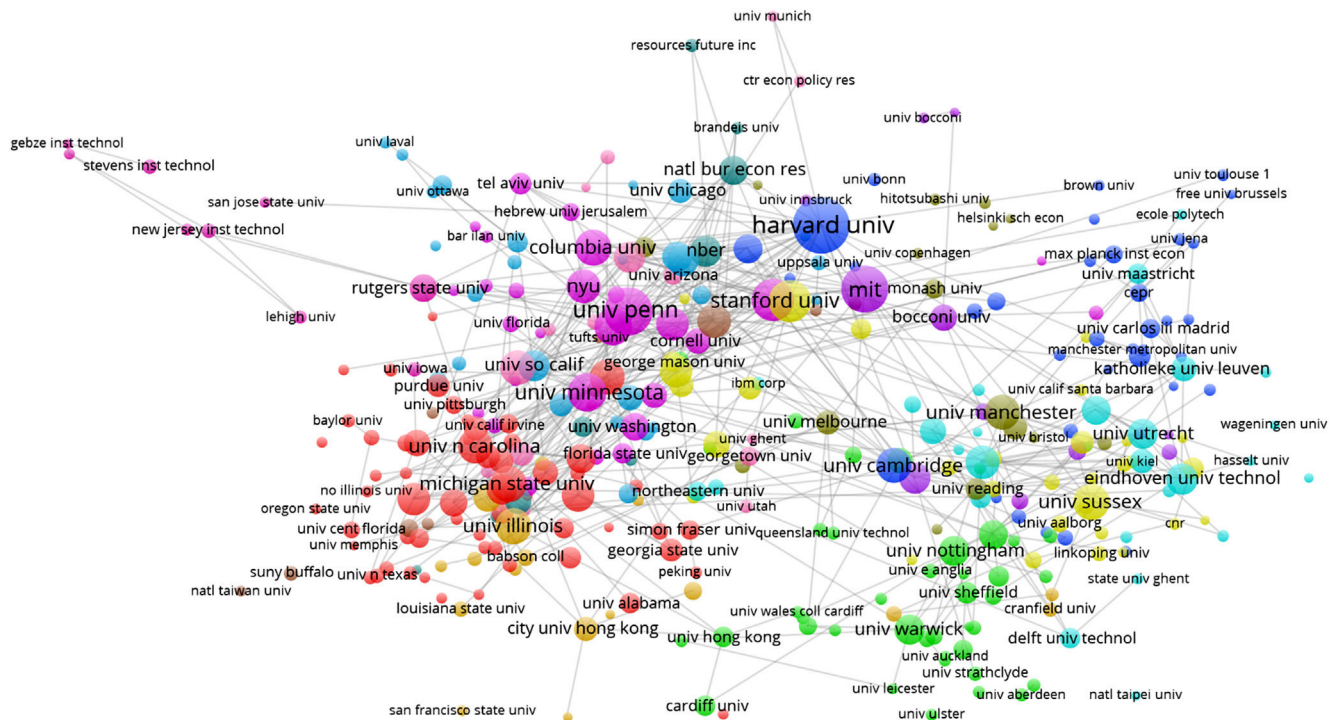


Fig. 3 – Co-citation between the most productive and influential universities in innovation research.

Table 10 – Leading universities in innovation in research policy and International Journal of Technology Management (IJTM).

Research policy						IJTM				
R	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	U. Sussex	95	4296	35	45.22	Aalto U.	14	119	6	8.50
2	U. Manchester	53	2115	25	39.91	Polytech. U. Milan	15	103	5	6.87
3	MIT	35	3191	26	91.17	U. Manchester	10	87	5	8.70
4	Harvard U.	33	2619	24	79.36	Nat. Sun Yat S. U.	10	38	5	3.80
5	Maastricht U.	31	1097	17	35.39	McMaster U.	9	164	5	18.22
6	Eindhoven U. T.	30	1858	18	61.93	Copenhagen B. S.	9	62	5	6.89
7	Bocconi U.	28	1360	17	48.57	U. Brighton	8	142	5	17.75
8	Imperial C. Lon.	25	959	14	38.36	Swiss Fed. ITZ	8	71	5	5.07
9	Georgia Tech.	24	554	13	23.08	Lappeenranta U. T.	14	61	4	4.36
10	U. Warwick	24	439	13	18.29	U. Twente	10	35	4	3.50
11	U. Cal. Berkeley	22	882	16	40.09	Nat. Chengchi U.	9	34	4	3.78
12	Erasmus U.	21	423	12	20.14	Rensselaer P. Inst.	9	34	4	3.78
13	U. Utrecht	20	597	13	29.85	Georgia Tech.	8	40	4	5.00
14	Copenhagen B. S.	20	915	10	45.75	U. Pisa	8	32	4	4.00
15	U. Amsterdam	19	1638	16	86.21	U. Quebec	8	29	4	3.63
16	U. Cambridge	19	350	11	18.42	UQAM Montreal	8	29	4	3.63
17	KU Leuven	17	1181	12	69.47	Cardiff U.	6	78	4	13.00
18	Chalmers U. Tech.	17	1088	11	64.00	Brunel U.	6	52	4	8.67
19	Lund U.	16	620	8	38.75	U. St. Gallen	5	57	4	11.40
20	Columbia U.	16	806	7	50.38	MIT	5	25	4	5.00
21	Aalborg U.	15	918	20	61.20	Aalborg U.	13	105	3	8.08
22	U. Nottingham	15	882	11	58.80	U. Western Sydney	11	19	3	1.73
23	Carnegie M. U.	15	1040	10	69.33	Aarhus U.	11	16	3	1.45
24	U. Oxford	15	193	8	12.87	U. Queensland	10	58	3	5.80
25	Swiss Fed ITZ	15	230	7	15.33	Chalmers U. Tech.	10	32	3	3.20
26	Stanford U.	14	612	7	43.71	Tsing Hua U.	10	25	3	2.50
27	U. Pennsylvania	13	1393	12	107.15	Erasmus U.	8	46	3	5.75
28	U. North Carolina	13	845	11	65.00	U. Cambridge	8	43	3	5.38
29	U. Toronto	13	301	9	23.15	UAM Madrid	6	24	3	4.00
30	U. Oslo	13	712	8	54.77	Nat. Cheng Kung U.	6	17	3	2.83

Table 11 – Leading universities in innovation in Technovation and Technological Forecasting and Social Change (TFSC).

R	Technovation					TFSC				
	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	Eindhoven U. T.	15	472	9	31.47	U. Utrecht	30	706	14	23.53
2	U. Manchester	12	166	9	13.83	Georgia Tech.	12	343	8	28.58
3	U. Sussex	22	301	8	13.68	Seoul Nat. U.	12	195	8	16.25
4	Cranfield U.	14	336	8	24.00	Delft U. Tech.	21	128	7	6.10
5	George W. U.	11	272	8	24.73	VU U. Amsterdam	14	241	7	17.21
6	Tokyo Inst. Tech.	19	263	7	13.84	U. Manchester	11	194	7	17.64
7	U. Ottawa	15	118	7	7.87	U. Sussex	10	179	7	17.90
8	U. Brighton	11	378	7	34.36	Tokyo Inst. Tech.	10	100	7	10.00
9	U. Warwick	11	158	7	14.36	Eindhoven U. Tech.	8	206	7	25.75
10	Aston U.	9	149	7	16.56	U. Lisboa	12	109	6	9.08
11	U. Cambridge	8	128	7	16.00	MIT	9	166	6	18.44
12	N. Chiao Tung U.	7	232	7	33.14	U. Twente	9	143	6	15.89
13	U. Aberdeen	7	168	7	24.00	U. New Mexico	8	205	6	25.63
14	KAIST Korea	10	86	6	8.60	Portland St. U.	11	198	5	18.00
15	U. Twente	9	119	6	13.22	IST Lisboa	11	90	5	8.18
16	Lappeenranta U. T.	7	199	6	28.43	U. Cambridge	9	121	5	13.44
17	NUI Galway	6	116	6	19.33	Erasmus U.	9	61	5	6.78
18	Complutense U.	6	108	6	18.00	U. Texas Austin	8	167	5	20.88
19	MIT	6	90	6	15.00	Nat. Tsing Hua U.	8	68	5	8.50
20	Open U. UK	11	143	5	13.00	U. Pretoria	6	87	5	14.50
21	Erasmus U.	10	149	5	14.90	Aalto U.	6	75	5	12.50
22	Chalmers U. Tech.	8	104	5	13.00	Tilburg U.	6	59	5	9.83
23	Polytech U. Milan	8	81	5	10.13	Carnegie M. U.	5	140	5	28.00
24	Linköping U.	7	128	5	18.29	Cardiff U.	5	106	5	21.20
25	Seoul National U.	7	93	5	13.29	Nat. Chi Nan U.	5	71	5	14.20
26	Imperial C. Lond.	6	155	5	25.83	George Mason U.	7	104	4	14.86
27	U. Granada	6	100	5	16.67	U. Beira Interior	6	105	4	17.50
28	Tilburg U.	6	83	5	13.83	Hebrew U. Jerusal.	6	73	4	12.17
29	U. Quebec	6	75	5	12.50	Harvard U.	5	127	4	25.40
30	Cardiff U.	5	107	5	21.40	Maastricht U.	5	110	4	22.00

Sussex, U. Cambridge, U. Manchester, and U. Warwick, among others. A second group of European universities that show a huge bibliographic network is formed by London Business School, Bocconi U., Erasmus U., and Eindhoven U. Technology, among others. All these groups, that cite papers in common, show a high bibliographic network, allowing that within each group there are universities with research focused on related topics. Note that Fig. 2 shows the 500 most significant connections between universities through the bibliographic coupling methodology.

On the other hand, Fig. 3 presents the co-citation structure of the most productive and influential universities in innovation research.

The most productive universities have the highest influence in the co-citation analysis. In this case, very important universities from the US – such as Harvard U., U. Pennsylvania, MIT, Stanford U., U. Minnesota, NYU and Columbia U. – form a special group of universities that receive more citations with respect to other universities in the world. Particularly, the cites that they receive publications from not only come from American universities, but also from different worldwide universities like Bocconi U., Monash U., Uppsala U., among others. Also, Fig. 3 shows a second group of European universities with the highest influence in the co-citation analysis (U. Cambridge, U. Manchester, U. Sussex, among others). This European group has more citations among themselves than citations with US universities. Please,

observe that Fig. 3 also presents the 500 strongest co-citation connections.

Individual journal analysis of the leading universities

A different issue to analyze is the importance of the universities in the leading journals of innovation. In this field, there are specialized (Table 2) and leading management journals where the articles are published (Table 1). Table 10 presents the leading universities in two most specialized journals in innovation: Research Policy and International Journal of Technology Management.

In both journals European universities are the most productive and influential institutions. For example, in Research Policy the UK and Netherlands universities obtain the best positions in the ranking. Then, USA universities represent less than a third of the leading universities in Research Policy. Also in the case of International Journal of Technology Management, universities from different European countries (Netherlands, Italy, UK, Switzerland, Spain, among others) represents more than two third of the leading institution. In the case of USA universities, they represent less than the 10% of the leading institutions in International Journal of Technology Management. Note that the table is ranked according to the *h*-index. In the case of a tie, the ranking is based on the number of publications and if another tie occurs, according to the number of citations.

Table 12 – Leading universities in innovation in Journal of Product Innovation Management (JPIM) and Technology Analysis & Strategic Management (TASM).

R	JPIM					TASM				
	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	Michigan St. U.	42	2422	20	57.67	Eindhoven U. Tech.	16	440	9	27.50
2	U. North Carolina	31	680	13	21.94	U. Manchester	26	314	8	12.08
3	Delft U. Tech.	28	578	13	20.64	U. Edinburgh	19	136	7	7.16
4	McMaster U.	20	1612	13	80.60	U. Sussex	16	318	7	19.88
5	Erasmus U.	22	701	12	31.86	Erasmus U.	14	107	7	7.64
6	Rensselaer P. Inst.	22	1050	11	47.73	U. Utrecht	12	129	7	10.75
7	North Caroli. St. U.	23	537	10	23.35	Chalmers U. Tech.	12	176	6	14.67
8	Northeastern U.	19	401	9	21.11	Open U. UK	11	99	6	9.00
9	Eindhoven U. Tech.	20	392	8	19.60	Maastricht U.	8	572	6	71.50
10	U. Utah	14	245	8	17.50	Georgia Tech.	14	63	5	4.50
11	U. Missouri KC	17	222	7	13.06	Delft U. Tech.	11	146	5	13.27
12	U. Illinois Chicago	17	174	7	10.24	U. Twente	7	483	5	69.00
13	U. Groningen	14	244	7	17.43	Linköping U.	7	82	4	11.71
14	U. Virginia	13	421	7	32.38	U. Ulster	7	36	4	5.14
15	U. Washington	12	488	7	40.67	Cardiff U.	6	43	4	7.17
16	UW Tacoma	12	488	7	40.67	Aalborg U.	5	118	4	23.60
17	Polytech U. Milan	11	372	7	33.82	U. Portsmouth	5	93	4	18.60
18	Bocconi U.	10	210	7	21.00	U. Amsterdam	5	34	4	6.80
19	Copenhagen B. S.	10	207	7	20.70	George W. U.	4	58	4	14.50
20	U. Alab. Huntsville	9	420	7	46.67	Cranfield U.	4	45	4	11.25
21	Concordia U. Can.	9	413	7	45.89	U. Queensland	4	43	4	10.75
22	Rochester I. Tech.	8	266	7	33.25	U. Strathclyde	4	42	4	10.50
23	U. Twente	14	117	6	8.36	U. Nottingham	7	82	3	11.71
24	U. Illinois Urb. Ch.	12	164	6	13.67	Polytech. U. Milan	7	53	3	7.57
25	Tilburg U.	11	94	6	8.55	U. Brighton	7	44	3	6.29
26	U. Washin. Seattle	10	436	6	43.60	U. Groningen	6	23	3	3.83
27	Temple U.	9	172	6	19.11	Tech. U. Denmark	5	26	3	5.20
28	City U. Hong Kong	8	556	6	69.50	Aalto U.	4	54	3	13.50
29	U. Manchester	8	158	6	19.75	City U. London	4	32	3	8.00
30	Vienna U. E. Bus.	7	342	6	48.86	Zhejiang U.	5	10	2	2.00

In Table 11 it is possible to analyze other two leading specialized journals in innovation, Technovation and Technological Forecasting and Social Change.

In Technovation, the UK and Netherlands universities are clearly leading the journal. However, different universities from different countries (Finland, Japan, Korea, Spain and Italy) publish in this journal. The USA universities do not publish so much in this journal although George Washington U. and MIT are some exceptions. In Technological Forecasting and Social Change it is possible to observe that this journal is more diverse and many universities, not only from UK, USA or Netherlands, regularly publish their research. However, according to the number of publications and citations, Netherlands universities are leading institutions in this journal. Table 12 shows the results for Journal of Product Innovation Management and Technology Analysis & Strategic Management.

In both, Journal of Product Innovation Management and Technology Analysis & Strategic Management, UK and Netherlands universities continue as leading institutions in each ranking. Particularly, in Journal of Product Innovation Management USA universities represent almost a third of the leading institution. In the case Technology Analysis & Strategic Management, the USA universities do not participate a lot.

Next, Table 13 shows both, universities in the last specialized journals in innovation (according to Table 2, R&D Management) and universities in the first leading management journal (according to Table 1, Strategic Management Journal).

In R&D Management, last specialized journals of Table 2, some universities from UK, Germany, Canada, Italy and Netherlands are in the best position of the ranking. For us, the more interesting case is the Italy universities position, particularly Polytechnic University of Milan, which is ranked as the most influential institution in the journal. On the other hand, Strategic Management Journal is the first leading management journals that Table 1 shows. Here, several USA universities get very good positions in the ranking, being Pennsylvania U. not only the most productive institution, but also the most influential university in this journal. Note that for the leading management journals that start in Table 13 and continues in Tables 14 and 15, the ranking is based also on the *h*-index. But now, in the case of a tie, the ranking depends first on the number of citations.

In the following Tables, we continue our analysis with the focus on leading management journals. Table 14 presents the leading universities in innovation research in Organization Science and Management Science.

Table 13 – Leading universities in innovation in R&D Management (RDM) and Strategic Management Journal (SMJ).

R	RDM					SMJ				
	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	U. Manchester	38	338	10	8.89	U. Pennsylvania	28	8577	26	306.32
2	Hamburg U. Tech.	6	225	8	37.50	U. Michigan	18	1882	14	104.56
3	U. Quebec	9	162	8	18.00	INSEAD Bus. Sch.	17	2340	14	137.65
4	UQAM Montreal	9	162	8	18.00	London Bus. Sch.	16	1938	14	121.13
5	Polytech U. Milan	12	598	8	49.83	Harvard U.	15	8358	14	557.20
6	U. Kiel	8	201	7	25.13	U. Minnesota TC	18	2139	13	118.83
7	Eindhoven U. Tech.	11	225	7	20.45	U. Illinois U. Cham	13	1797	12	138.23
8	U. St. Gallen	11	517	7	47.00	NYU	12	1700	11	141.67
9	U. Sussex	12	206	7	17.17	Duke U.	11	435	9	39.55
10	Imperial C. London	7	272	6	38.86	Columbia U.	9	1520	9	168.89
11	U. Nottingham	8	67	6	8.38	U. Maryland C. P.	9	1620	8	180.00
12	KU Leuven	8	123	6	15.38	U. Texas Austin	9	1809	8	201.00
13	Linköping U.	8	174	6	21.75	Stanford U.	8	5029	8	628.63
14	Swiss Federal ITZ	9	138	6	15.33	Texas A&M U.	8	876	7	109.50
15	Chalmers U. Tech.	9	212	6	23.56	Purdue U.	7	392	7	56.00
16	U. Brighton	5	60	5	12.00	U. West. Ontario	7	1157	7	165.29
17	U. Warwick	5	126	5	25.20	HEC Paris	8	619	6	77.38
18	Copenhagen B. S.	6	90	5	15.00	Boston U.	7	591	6	84.43
19	Nat. Tsing Hua U.	8	132	5	16.50	Emory U.	7	899	6	128.43
20	Korea Adv. IST	4	70	4	17.50	Georgia Tech.	7	793	6	113.29
21	U. Cal. Berkeley	4	447	4	111.75	Michigan St. U.	7	449	6	64.14
22	Loughborough U.	5	75	4	15.00	Dartmouth Col.	6	1421	6	236.83
23	Polyt. Montreal	5	83	4	16.60	MIT	6	1414	6	235.67
24	U. Montreal	5	83	4	16.60	Ohio St. U.	6	712	6	118.67
25	Cranfield U.	6	51	4	8.50	UNC Chapel Hill	6	427	6	71.17
26	McMaster U.	6	134	4	22.33	Arizona St. U.	6	661	5	110.17
27	U. Cambridge	10	76	4	7.60	Georgetown U.	6	3699	5	616.50
28	Victoria U. Wellin.	3	45	3	15.00	Nat. U. Singapore	5	364	5	616.50
29	Temple U.	4	42	3	10.50	S. Methodist U.	5	648	5	72.80
30	Rensselaer P. Inst.	4	86	3	21.50	Temple U.	5	371	5	129.60

The USA universities get the first position in both journals. Now, Organization Science and Management Science are journals dominated by USA institutions than represent more than the 75% and 90% of their total number of publications, respectively. However, INSEAD Business School and London Business School, are two interesting cases in both journals. For example, INSEAD obtains very good results in both journals being in the fifth and fourth position, respectively. London Bus. Sch., obtains good results too being in the tenth in Organization Science and twenty-seventh in Management Science. With respect to the leading university of Organization Science and Management Science, Pennsylvania U. continues as the most productive and influential university in both journals.

Finally, Table 15 presents the results for two groups of journals. The first one includes the Academy of Management Journal and the Academy of Management Review. The second group includes the Journal of Business Venturing, Journal of International Business Studies, Journal of Management, Journal of Management Studies, Journal of Marketing, and MIS Quarterly.

In the Academy of Management Journals, the USA universities are clearly the leading universities and the rest of the universities from Europe or Asia do not publish many papers (some exceptions come from UK, Netherlands and France). In the other selected journals the results are also similar

although the differences between the USA universities and the rest are not important.

Conclusions

This article provides a general bibliometric overview of the most influential and productive universities in innovation research between 1989 and 2013. The number of publications, citation structure and *h*-index during this period are considered. The results show that the most prestigious American universities are not only the most influential, taking into account the number of citations of their publications, but are also highly productive universities in this area, given the greater number of publications that they have accumulated on innovation research in the last twenty five years. There are also some universities in the UK, France and the Netherlands which are worth mentioning. They not only appear in the top 20 of our ranking, but their presence increases as we reach the list of top 100 universities, especially those in the UK and Netherlands. The influence of these universities in research innovation primarily comes from publishing in specialized journals that have been created in Europe.

The novelty of this paper, unlike other rankings developed, is that in its methodology it analyzes the *h*-index of

Table 14 – Leading universities in innovation in Organization Science and Management Science.

Organization Science						Management Science				
R	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	U. Pennsylvania	33	9276	24	281.09	U. Pennsylvania	35	3834	29	109.54
2	MIT	17	2732	14	160.71	MIT	25	3449	20	137.96
3	Harvard U.	15	1752	14	116.80	Harvard U.	23	1747	16	75.96
4	Stanford U.	12	2056	12	171.33	INSEAD B. S.	20	1779	16	88.95
5	INSEAD B. S.	13	1880	12	144.62	Carnegie M. U.	16	2293	14	143.31
6	U. Texas Austin	13	579	12	44.54	U Michigan	19	1036	14	54.53
7	NYU	11	920	10	83.64	NYU	15	1268	13	84.53
8	U. Michigan	10	851	9	85.10	U. Maryland C. P.	17	1136	13	66.82
9	U. Minnesota TC	16	783	9	48.94	Columbia U.	12	1849	12	154.08
10	London B. S.	10	561	9	56.10	U. Toronto	13	666	11	51.23
11	U. Southern Cal.	7	706	7	100.86	Boston U.	11	443	10	40.27
12	McGill U.	7	514	7	73.43	Duke U.	13	284	10	21.85
13	U. Maryland C. P.	6	1239	6	206.50	Georgia Tech.	15	400	9	26.67
14	Erasmus U.	6	931	6	155.17	U Illinois U. Cham.	8	552	8	69.00
15	Ohio St. U.	7	464	6	66.29	Stanford U.	8	385	8	48.13
16	Columbia U.	6	411	6	68.50	U. Cal. Berkeley	9	264	7	29.33
17	Bocconi U.	8	282	6	35.25	Northwestern U.	7	865	6	123.57
18	Duke U.	7	218	6	31.14	UCLA	7	574	6	82.00
19	Stockholm Sch. E.	5	5022	5	1004.40	U. Florida	6	301	6	50.17
20	Dartmouth U.	6	803	5	133.83	Penn St. U.	5	384	5	76.80
21	Penn St. U.	5	648	5	129.60	UNC Chapel Hill	5	494	5	98.80
22	Washington U.	6	529	5	88.17	Georgetown U.	4	1288	4	322.00
23	Copenhagen B. S.	7	489	5	69.86	U. Minnesota TC	4	228	4	57.00
24	U. Illinois U. Cham.	6	437	5	72.83	Purdue U.	4	207	4	51.75
25	Georgia Tech.	5	372	5	74.40	Washington U.	4	179	4	44.75
26	U. Warwick	6	366	5	61.00	Case W. Reser. U.	5	143	4	28.60
27	Northwestern U.	5	234	5	46.80	London B. S.	4	139	4	34.75
28	Hitotsubashi U.	4	3726	4	931.50	U. Texas Austin	5	129	4	25.80
29	Georgetown U.	4	1607	4	401.75	U. Texas Dallas	4	128	4	32.00
30	Carnegie M. U.	4	278	4	69.50	U. Cal. San Diego	6	54	4	9.00

each university in terms of their publications on innovation. The *h*-index is an indicator which combines articles with citations, indicating the number of studies *X* that have received *X* or more citations. The results of this paper, as per the *h*-index analysis show that the most influential universities in the field of innovation are: the University of Pennsylvania, Harvard University, MIT, Stanford University, University of California Berkeley and Columbia University, all located in the USA. The most influential universities in UK would be the University of Sussex, London Business School and The University of Manchester. In France, the most influential would be INSEAD Business School. Finally, the most influential universities in the Netherlands are Erasmus University, Eindhoven University of Technology and Maastricht University.

The ranking presented in this paper, aside from the *h*-index, offers a few additional indicators, such as the total number of publications in Innovation (TPI) and the total number of citations accumulated in innovation (TCI). This permits us to see that universities with the highest *h*-index are not always those that produce the largest number of publications. It is possible to say that universities with higher *h*-index are more influential, but not necessarily those with the highest number of publications in innovation. Still, in many cases it does occur, mainly with the universities in the top 10 ranking.

In order to deepen the above analysis, the ranking presented also shows the analysis of the *h*-index, productivity

and citations pertaining to the publications in the seven specialized journals on innovation research of each public university. In this regard, it is notable that although US universities have published a significant number of papers, European universities have been making strong efforts to publish on innovation in the last 25 years. In general terms, effort from universities in the UK and Netherlands to publish in the more specialized journals on innovation research has been greater. This could be biased due to the origin of the more specialized journals such as Research Policy, International Journal of Technology Management and Technovation, which are mainly European.

The results of this paper are particularly different from those earlier studies, such as by Linton (2004), which only considered American institutions in its analysis. The differences found are natural, particularly because the effort certain European universities are making in the study of innovation research has been very important and have therefore come a long way in terms of the number of publications on the subject. At the same time, the fact that we use the *h*-index as a leading indicator, instead of just considering the number of publications to do the ranking, as suggested by Yang and Tao (2012), we can do a much more thorough analysis and discover not only the most productive universities in innovation research but also the most influential.

Although we believe the results found in this paper are valuable, we still see need to further develop studies to

Table 15 – Leading universities in innovation in Academy of Management Journal (AMJ) and Review (AMR) and other selected journals (OSJ).

AMJ & AMR						OSJ ^a				
R	University	TP	TC	H	TC/TP	University	TP	TC	H	TC/TP
1	U. Pennsylvania	16	2660	15	166.25	U. Minnesota TC	28	5594	19	199.79
2	Stanford U.	13	2583	12	198.69	U. Maryland C. P.	19	4247	19	223.53
3	Texas A&M U.	11	3905	11	161.08	Erasmus U.	22	814	18	37.00
4	Arizona St. U.	12	1933	11	355.00	Texas A&M U.	16	1958	16	70.50
5	UW Tacoma	11	1643	11	149.36	Michigan St. U.	20	2430	15	121.50
6	Harvard U.	12	2881	10	240.08	Georgia St. U.	15	2288	14	152.53
7	London Bus. Sch.	9	2013	9	223.67	Indiana U. Bloom.	17	1451	13	85.35
8	U. Washin. Seattle	9	1426	9	158.44	U. Texas Austin	13	1244	13	95.69
9	U. Maryland C. P.	8	1730	8	216.25	U. Pennsylvania	16	2099	12	131.19
10	U. Michigan	9	2189	7	243.22	U. Southern Cal.	14	1594	12	79.71
11	Columbia U.	7	1798	7	256.86	U. South Car. Colu.	15	1020	11	68.00
12	NYU	7	1499	7	214.14	U. West. Ontario	12	1010	11	43.08
13	U. Southern Cal.	7	1488	7	212.57	U. Connecticut	12	585	11	41.00
14	Emory U.	7	1293	7	184.71	Rensselaer P. Inst.	13	560	11	48.75
15	U. Minnesota TC	7	1151	7	164.43	Imperial C. Lond.	12	492	11	84.17
16	INSEAD B. S.	8	627	7	78.38	UNC Chapel Hill	12	1357	10	49.67
17	UNC Chapel Hill	6	1190	6	198.33	U. Georgia	10	1038	10	81.50
18	Carnegie M. U.	6	937	6	156.17	Clemson U.	12	978	10	113.08
19	Boston U.	6	680	6	113.33	Case W. Reser. U.	12	596	10	103.80
20	U. Illinois U. Cham.	6	474	6	79.00	London B. S.	9	931	9	66.36
21	U. Texas Austin	7	332	6	47.43	Temple U.	10	903	9	37.82
22	U. Wisconsin Mad.	5	2164	5	432.80	Georgia Tech.	10	771	9	77.10
23	U. South Car. Colu.	5	1786	5	357.20	City U. London	11	730	9	90.30
24	U. Oklahoma	5	1064	5	212.80	York U. Canada	11	416	9	103.44
25	George Wash. U.	5	894	5	178.80	U. Washington	9	1638	8	182.00
26	Purdue U.	6	704	5	117.33	U. Illinois Chicago	9	1117	8	124.11
27	Imperial C. Lond.	5	223	5	44.60	Arizona St. U.	10	778	8	77.80
28	Hong Kong UST	5	206	5	41.20	U. British Columbia	9	728	8	80.89
29	Georgia Tech.	4	1101	4	275.25	Penn St. U.	9	695	8	77.22
30	Clemson U.	4	567	4	141.75	Duke U.	8	734	7	33.90

^a OSJ includes: Journal of Business Venturing (JBV), Journal of Marketing (JMK), Journal of Management Studies (JMS), MIS Quarterly (MISQ), Journal of Management (JM), Journal of International Business Studies (JIBS).

complement the analysis of what the most influential universities in innovation research are, who the most prominent authors are and which journals have greater impact and influence on the material. Furthermore, a comparison of variation of results over the years could be very important.

REFERENCES

- Ball, D., & Rigby, J. (2006). Disseminating research in management of technology: Journals and authors. *R&D Management*, 36(2), 205–215.
- Bonilla, C., Merigó, J. M., & Torres-Abad, C. (2015). Economics in Latin America: A bibliometric analysis. *Scientometrics*, 105(2), 1239–1252.
- Broadus, R. N. (1987). Toward a definition of bibliometrics. *Scientometrics*, 12, 373–379.
- Cancino, C., Merigó, J. M., & Palacios-Marqués, D. (2015). A bibliometric analysis of innovation research. *CID Working Papers*. Chile: University of Chile.
- Carvalho, M. M., Fleury, A., & Lopes, A. P. (2013). An overview of the literature on technology roadmapping (TRM): Contributions and trends. *Technological Forecasting & Social Change*, 80, 1418–1437.
- Chen, J., Damanpour, F., & Reilly, R. R. (2010). Understanding antecedents of new product development speed: A meta-analysis. *Journal of Operations Management*, 28(1), 17–33.
- Chun-Hao, C., & Jian-Min, Y. (2012). A bibliometric study of financial risk literature: A historic approach. *Applied Economics*, 44(22), 2827–2839.
- Daim, T. U., Rueda, G., Martin, H., & Gerdri, P. (2006). Forecasting emerging technologies: Use of bibliometrics and patent analysis. *Technological Forecasting & Social Change*, 73, 981–1012.
- Dosi, G., Malerba, F., Ramello, G. B., & Silva, F. (2006). Information, appropriability and the generation of innovative knowledge four decades after Arrow and Nelson: An introduction. *Industrial and Corporate Change*, 15, 891–901.
- Fagerberg, J., & Verspagen, B. (2009). Innovation studies: The emerging structure of a new scientific field. *Research Policy*, 38, 218–233.
- Fagerberg, J., Fosaas, M., & Sapprasert, K. (2012). Innovation: Exploring the knowledge base. *Research Policy*, 41, 1132–1153.
- Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences of the United States of America*, 102, 16569–16572.
- Linton, J. (2004). Perspective: Ranking business schools on the management of technology. *Journal of Product Innovation Management*, 21(6), 416–430.
- Martin, B. R. (2012). The evolution of science policy and innovation studies. *Research Policy*, 41, 1219–1239.

- Martyn, J. (1964). Bibliographic coupling. *Journal of Documentation*, 20, 236.
- Merigó, J. M., Gil-Lafuente, A. M., & Yager, R. R. (2015). An overview of fuzzy research with bibliometric indicators. *Applied Soft Computing*, 27, 420–433.
- Neely, A. (2005). The evolution of performance measurement research: Developments in the last decade and a research agenda for the next. *International Journal of Operations and Production Management*, 25(12), 1264–1277.
- Norton, M. J. (2001). *Introductory concepts in information science*. New Jersey.
- Podsakoff, P. M., MacKenzie, S. B., Podsakoff, N. P., & Bachrach, D. G. (2008). Scholarly influence in the field of management: A bibliometric analysis of the determinants of university and author impact in the management literature in the past quarter century. *Journal of Management*, 34, 641–720.
- Prithchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, 25(4), 348–349.
- Rafols, I., Leydesdorff, L., O'Hare, A., Nightingale, P., & Stirling, A. (2012). How journal rankings can suppress interdisciplinary research: A comparison between Innovation Studies and Business & Management. *Research Policy*, 41(7), 1262–1282.
- Seol, S. S., & Park, J. M. (2008). Knowledge sources of innovation studies in Korea: A citation analysis. *Scientometrics*, 75(1), 3–20.
- Shafique, M. (2013). Thinking inside the box: Intellectual structure of the knowledge base of innovation research (1988–2008). *Strategic Management Journal*, 34, 62–93.
- Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, 24(July–August), 265–269.
- Thieme, J. (2007). Perspective: The world's top innovation management scholars and their social capital. *Journal of Product Innovation Management*, 24(3), 214–229.
- Trieschmann, J. S., Dennis, A. R., Northcraft, G. B., & Niemi, A. W. (2000). Serving multiple constituencies in business schools: MBA program versus research performance. *Academy of Management Journal*, 43, 1130–1141.
- Wagstaff, A., & Culyer, A. J. (2012). Four decades of health economics through a bibliometric lens. *Journal of Health Economics*, 31, 406–439.
- Yang, P., & Tao, L. (2012). Perspective: Ranking of the world's top innovation management scholars and universities. *Journal of Product Innovation Management*, 29(2), 319–331.