11-2008

Bibliometrics: From "Bean Counting" to Academic Accountability

Ruth A. Pagell
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Li Ka Shing Library

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Bibliometrics

CoNCERT
全國學術電子資訊資源共享聯盟
Consortium on Core Electronic Resources in Taiwan

From "Bean Counting" to Academic Accountability

Taiwan

Ruth A Pagell

13 November 2008

Revised 24 November 2008 for Research Council

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Applied Bibliometrics: Applications and Issues Outline

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- History of bibliometrics
- **Publications and citations**
- **Providers of citations**
- Journal metrics
- **New measures**
- Applications
  Ranking universities
  Ranking countries
- **Other sources, other measures**
- Conclusion

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Bibliometric Time Line

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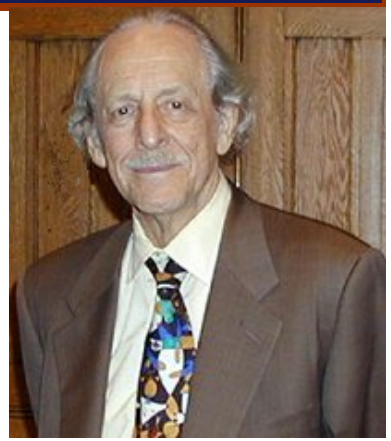

Early 19th Century
Origin in Law & Psychology

1926-46
Early "laws" Lotka's Law

1955
Eugene Garfield (EG)

1961
SSI is born

1969
Prichard coins term bibliometrics

1978
Scientometrics launched

1980s
New technology (cite mapping)

1986
EG wins 1st DeSotta prize

1993
Intl Society for Scientometrics & Infometrics

Late 1990's
ISI goes online directly

2004
Scopus launched

Present
Scientometrics used by governments and funding agencies; Google Scholar

From *Research Trends* (2007)no 1 AND 2

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Lotka's Law

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In 1926, Alfred Lotka formulated his power law (known as Lotka's Law) describing the frequency of publication by authors in a given field. According to this bibliometric law of scientific productivity, **only a very small percentage (~6%) of authors in a field will produce more than 10 articles while the majority (perhaps 60%) will have but a single article published.**

(Lotka, 1926)

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Pre-Digital Citation Indices

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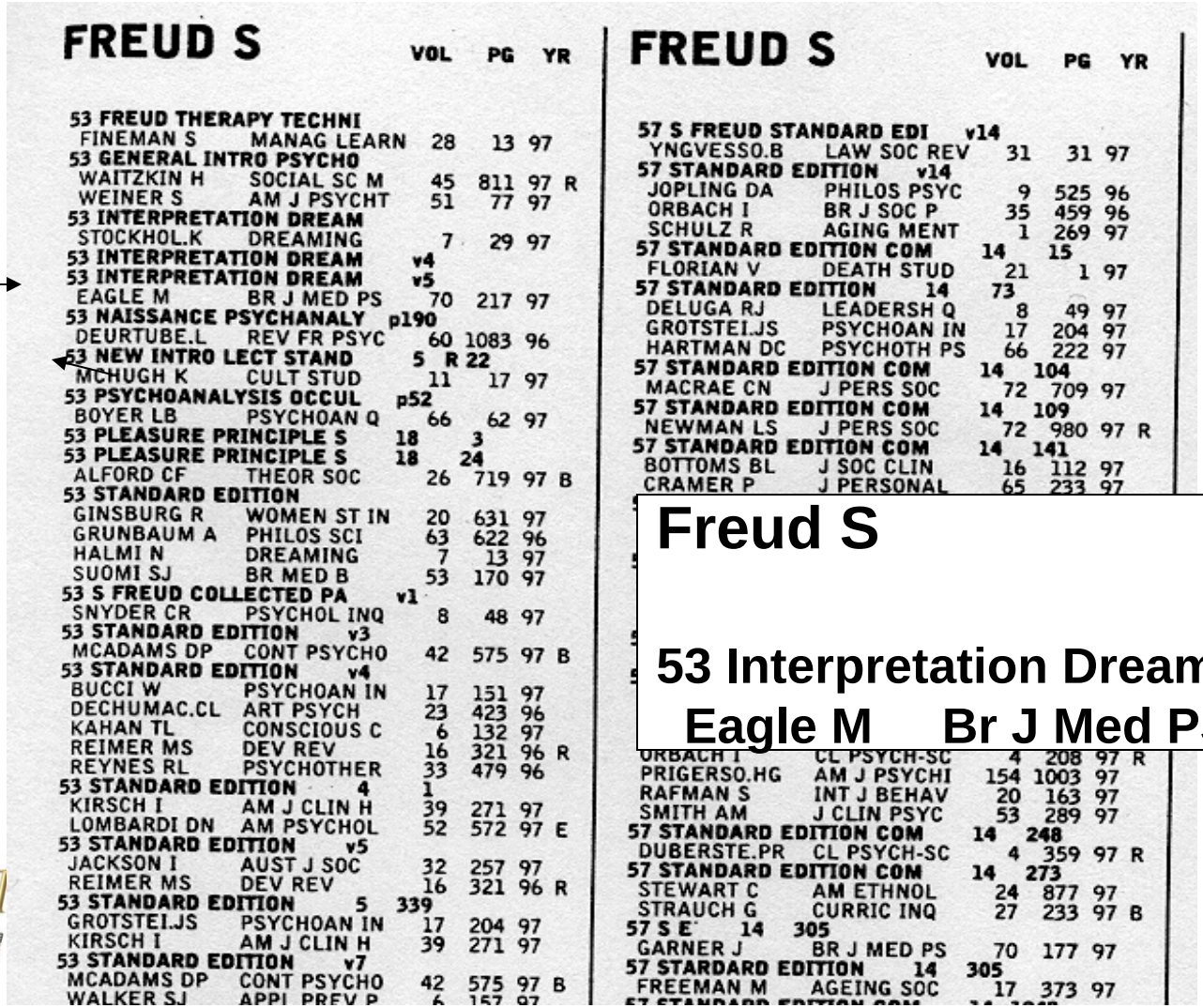

FREUD S

		VOL	PG	YR	
53 FREUD THERAPY TECHNI					
FINEMAN S	MANAG LEARN	28	13	97	
53 GENERAL INTRO PSYCHO					
WAITZKIN H	SOCIAL SC M	45	811	97	R
WEINER S	AM J PSYCHT	51	77	97	
53 INTERPRETATION DREAM					
STOCKHOL.K	DREAMING	7	29	97	
53 INTERPRETATION DREAM	**v4**				
53 INTERPRETATION DREAM	**v5**				
EAGLE M	BR J MED PS	70	217	97	
53 NAISSANCE PSYCHANALY	**p190**				
DEURTUBE.L	REV FR PSYC	60	1083	96	
53 NEW INTRO LECT STAND	**5 R 22**				
MCHUGH K	CULT STUD	11	17	97	
53 PSYCHOANALYSIS OCCUL	**p52**				
BOYER LB	PSYCHOAN Q	66	62	97	
53 PLEASURE PRINCIPLE S	**18 3**				
53 PLEASURE PRINCIPLE S	**18 24**				
ALFORD CF	THEOR SOC	26	719	97	B
53 STANDARD EDITION					
GINSBURG R	WOMEN ST IN	20	631	97	
GRUNBAUM A	PHILOS SCI	63	622	96	
HALMI N	DREAMING	7	13	97	
SUOMI SJ	BR MED B	53	170	97	
53 S FREUD COLLECTED PA	**v1**				
SNYDER CR	PSYCHOL INQ	8	48	97	
53 STANDARD EDITION	**v3**				
MCADAMS DP	CONT PSYCHO	42	575	97	B
53 STANDARD EDITION	**v4**				
BUCCI W	PSYCHOAN IN	17	151	97	
DECHUMAC.CL	ART PSYCH	23	423	96	
KAHAN TL	CONSCIOUS C	6	132	97	
REIMER MS	DEV REV	16	321	96	R
REYNES RL	PSYCHOTHER	33	479	96	
53 STANDARD EDITION	**4**	**1**			
KIRSCH I	AM J CLIN H	39	271	97	
LOMBARDI DN	AM PSYCHOL	52	572	97	E
53 STANDARD EDITION	**v5**				
JACKSON I	AUST J SOC	32	257	97	
REIMER MS	DEV REV	16	321	96	R
53 STANDARD EDITION	**5 339**				
GROTSTEI.JS	PSYCHOAN IN	17	204	97	
KIRSCH I	AM J CLIN H	39	271	97	
53 STANDARD EDITION	**v7**				
MCADAMS DP	CONT PSYCHO	42	575	97	B
WALKER SJ	APPL PREV P	6	157	97	

FREUD S

		VOL	PG	YR	
57 S FREUD STANDARD EDI	**v14**				
YNGVESSO.B	LAW SOC REV	31	31	97	
57 STANDARD EDITION	**v14**				
JOPLING DA	PHILOS PSYC	9	525	96	
ORBACH I	BR J SOC P	35	459	96	
SCHULZ R	AGING MENT	1	269	97	
57 STANDARD EDITION COM	**14 15**				
FLORIAN V	DEATH STUD	21	1	97	
57 STANDARD EDITION	**14 73**				
DELUGA RJ	LEADERSH Q	8	49	97	
GROTSTEI.JS	PSYCHOAN IN	17	204	97	
HARTMAN DC	PSYCHOTH PS	66	222	97	
57 STANDARD EDITION COM	**14 104**				
MACRAE CN	J PERS SOC	72	709	97	
57 STANDARD EDITION COM	**14 109**				
NEWMAN LS	J PERS SOC	72	980	97	R
57 STANDARD EDITION COM	**14 141**				
BOTTOMS BL	J SOC CLIN	16	112	97	
CRAMER P	J PERSONAL	65	233	97	
ORBACH I	CL PSYCH-SC	4	208	97	R
PRIGERSO.HG	AM J PSYCHI	154	1003	97	
RAFMAN S	INT J BEHAV	20	163	97	
SMITH AM	J CLIN PSYC	53	289	97	
57 STANDARD EDITION COM	**14 248**				
DUBERSTE.PR	CL PSYCH-SC	4	359	97	R
57 STANDARD EDITION COM	**14 273**				
STEWART C	AM ETHNOL	24	877	97	
STRAUCH G	CURRIC INQ	27	233	97	B
57 S E 14 305					
GARNER J	BR J MED PS	70	177	97	
57 STARDARD EDITION	**14 305**				
FREEMAN M	AGEING SOC	17	373	97	

Freud S

	Vol	Pg	YR
53 Interpretation Dream			
Eagle M Br J Med PS	**70**	**217**	**97**

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From Garfield's Vision to 21st century Capability

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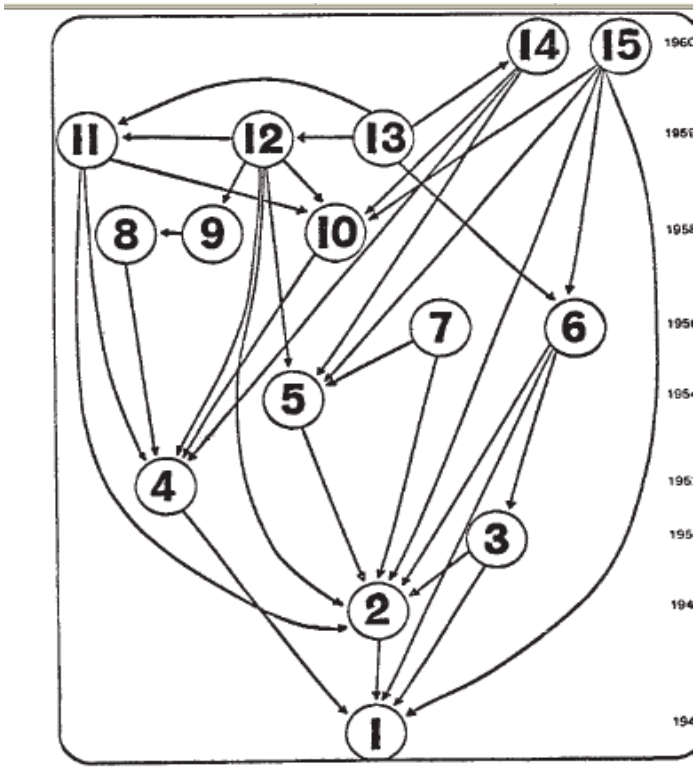

Fig. 1. Citation network of fifteen articles on nucleic acids.

Garfield (1970) *Nature*

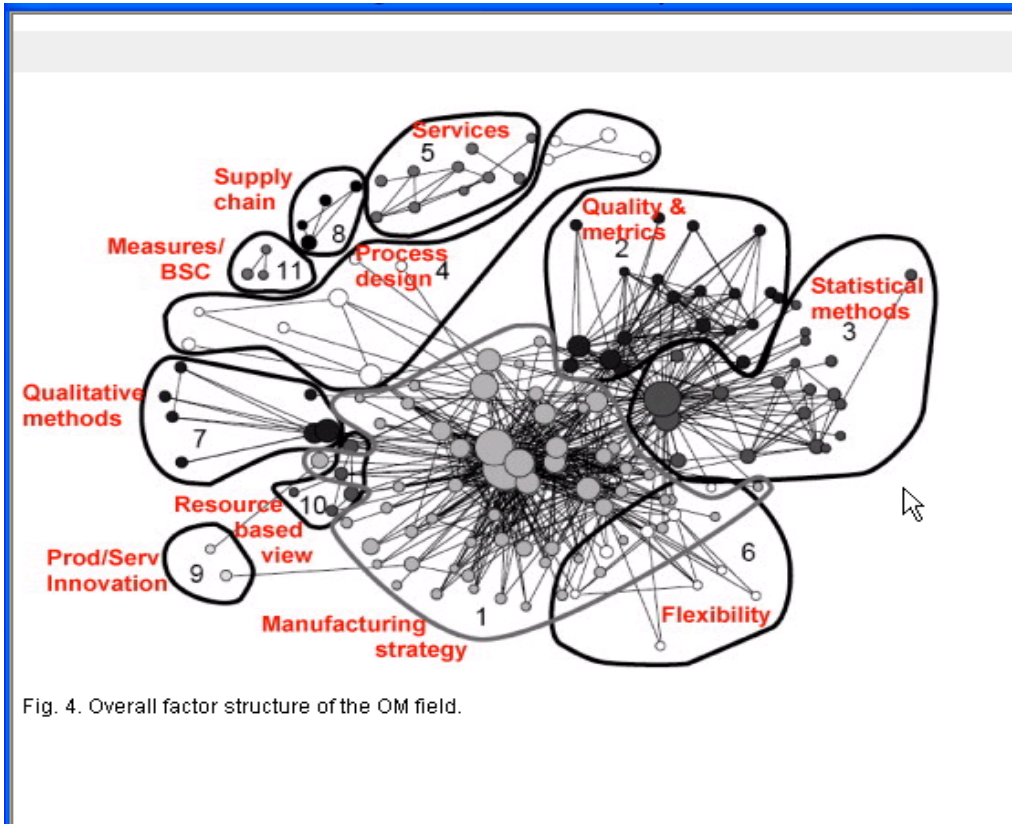

Fig. 4. Overall factor structure of the OM field.

Pilkington, A and Meredith, J (2008) *J of Op Mgmt* (in press)

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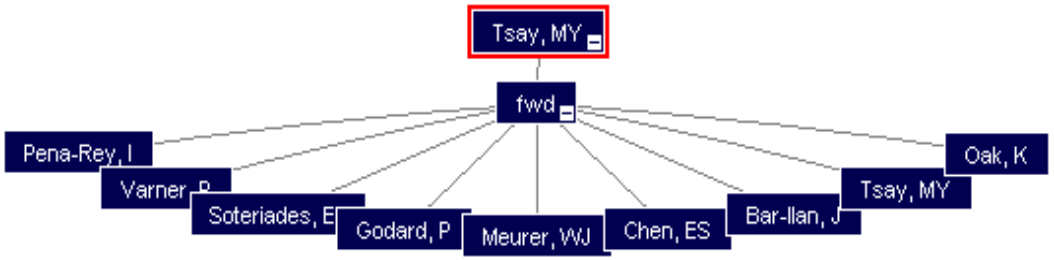
Social Networking – ISI Mapping



ce: ISI Web of Knowledge℠, , www.thomsonscientific.com

cord details for the nodes are displayed below (double-click a node to show its details). Click a checkbox below to locate that node above.

Primary Author	Journal Name	Article title
Meurer, WJ	2007-ACADEMIC EMERGENCY MEDICINE	Qualitative data collection and analysis methods: The INSTINCT trial
Tsay, MY	2008-SCIENTOMETRICS	A bibliometric analysis of hydrogen energy literature, 1965-2005
Soteriades, ES	2006-BMC PUBLIC HEALTH	A bibliometric analysis in the fields of preventive medicine, occupational and environmental medicine, epidemiology, and public health
Varner, P	2006-OPTOMETRY AND VISION	Applying number-needed-to-treat (NNT) analysis to ophthalmic clinical trials

aying 1 - 10 of 10 Display 10 Records per page

Bibliometric analysis of the literature of randomized controlled trials

Number / Title	146857437 / Bibliometric analysis of the literature of randomized controlled trials
Journal Title	JOURNAL OF THE MEDICAL LIBRARY ASSOCIATION
Publication Year	2005
Author	Tsay, MY
Group Author	
Source	J MED LIBR ASSOC

WOS, 4 November, 2008

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The Players

SMU SINGAPORE MANAGEMENT UNIVERSITY

The Government

The Organization

The Faculty

The Librarian

The Researcher

The Providers

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Know your Country's Evaluation Policy

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Higher Education Evaluation & Accreditation Council of Taiwan (HEEACT)

UK Research Assessment Exercise (RAE) and Higher Education Funding Council for England (HEFCE)

Australia Research Quality Framework (RQF)

New Zealand Performance-Based Research Fund (PBRF)

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HEEACT

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SMU's Research Strategy

SMU SINGAPORE MANAGEMENT UNIVERSITY

Vision

To be a premier university, internationally recognised for its world class research and distinguished teaching.

Mission

To create and disseminate knowledge. SMU aspires to generate leading edge research with global impact…

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Effect of Strategy on Implementation

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The University has a mandate to report faculty output to the Ministry of Education

The Faculty have a mandate from administration to publish in “A” journals

The Library works with administration to advise, coordinate and train staff on measuring faculty output.

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Know your Organization's Research Strategy

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National Taiwan University's Mission and Vision

…. Broadly embracing top professionals from around the world, and dedicated to our core philosophy of excellence in education, **excellence in research,** and social concern, we aim to make NTU into a renowned bastion of education and research in fulfilling our vision to be ranked "the pinnacle of the Chinese and the first-rate in the world."

http://top100.ntu.edu.tw/en/overview.htm

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Know your Organization's Strategy

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Vision for a Teaching University

To be the Centre of Leadership and Management Excellence; and the embodiment of Lifelong Learning.

Mission

- Spearhead management thought leadership
- Be the preferred strategic partner of corporations in maximising return on human capital
- Be the choice provider of continuing education to individuals
- Transform *Teaching U* into a regional brand

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The Players
Your Faculty

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"There is now mounting pressure all over the world for academics to publish in the most-cited journals and rake in as many citations to their work as possible" (from article, Leung & Kwok, 2007)

"I need to publish in an international A journal but I would like to write for local practitioners" (conversation, September 2007)

"I want my articles to be read; being on a teaching syllabus is as important as being cited. I would like to know how many times my articles have been downloaded" (conversation, 10 August 2008)

"Even a citation in student handbooks, library guides, textbooks or editorial notes shows that an academic has an impact on the field" (article, Harzing 2005, p.65)

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The Players
Librarians

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Librarians want:

Standardization of measures across faculty and departments

Authoritative, replicable metrics from a respected source

Disambiguation of names and institutions to identify the right author

List of “quality” publications?

Free tools

Our administration wants from the library:

A list of high impact journals in each field – just numbers is not enough

Peer analysis showing how we compare to top tier institutions.

Coordination of the counting process; training and checking

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The Players
Researchers

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Concentration of bibliometrics and citation analysis articles across journals and disciplines

Research methodology applied to new citation tools

New measurements being introduced

% of articles

	<91	91-00	2001--
Top 6 Journals	50	31	15
Social Science *	56	31	26
Computer Science *	46	22	33
Medicine	12	48	54

* Includes . LIS articles

from *SCOPUS* 22/09/2008

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Tracking Articles on Bibliometrics and Citation Analysis in *WOS* and SCOPUS

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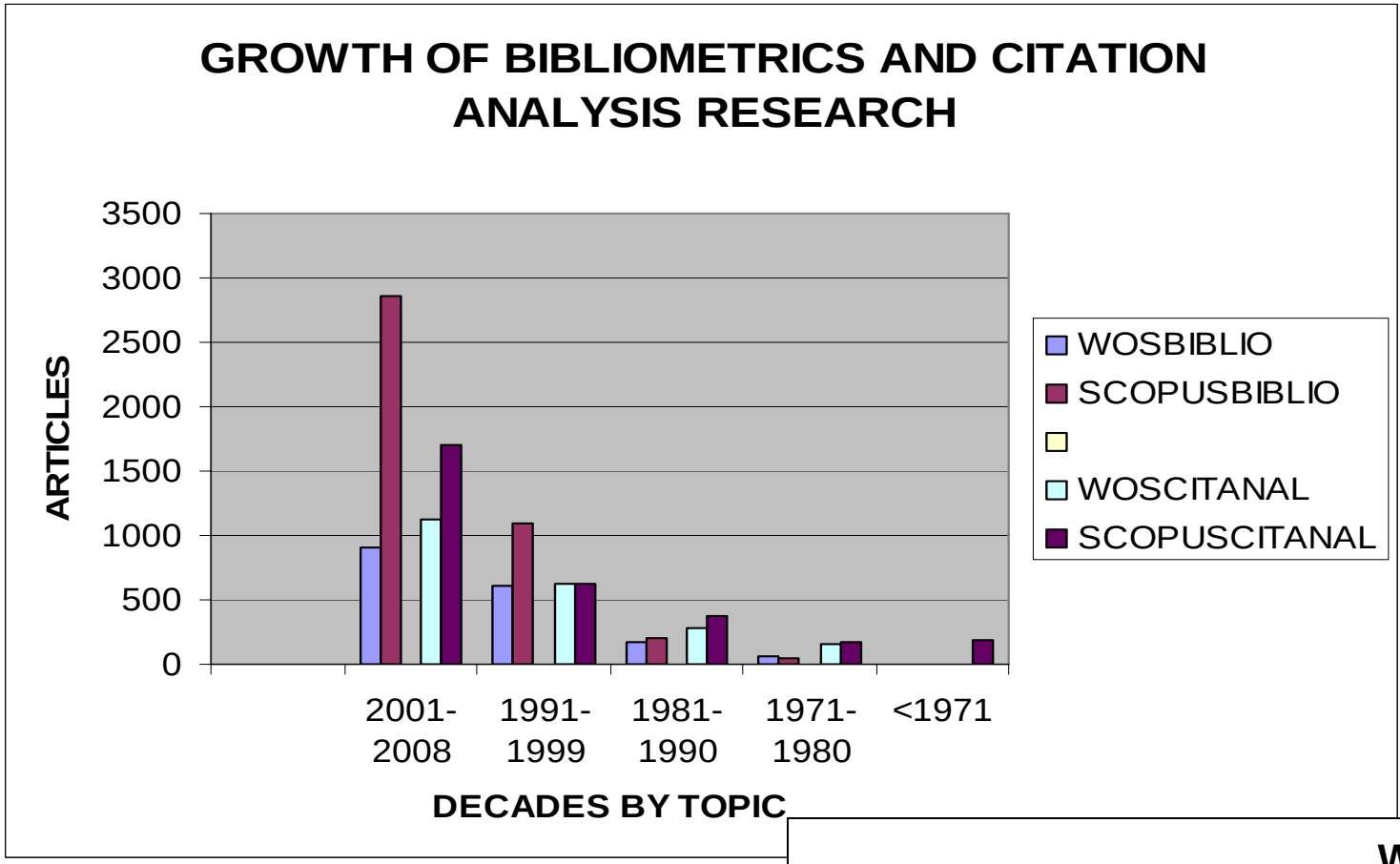

	WOS	SCOPUS
1st year bibliometrics	1969	1972
1st year citation analysis	1965	1935

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Levels of Measurement

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Country for benchmarking and comparisons

University for government and stakeholder reporting

Department for group performance *

Individual faculty for tenure and promotion *

* Note: Requires manual checking from departmental input data

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Citation Counting Structure

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UNIVERSITY LEVEL REPORTING

For MOE

For aggregate SMU data

For year-on-year changes

For comparisons across internal categories

SCHOOL LEVEL REPORTING

For Disciplines

For Faculty

Commercial Citation Indexes

Web of Science (WOS)

SCI-e , SSCI, A&HI

Scopus

Web Tools

Google Scholar

Commercial Databases

Science Direct, EBSCO, Proquest, JStor, Hein Online

Scholarly Websites

Repec, ACM Portal, Citeseer

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The Metrics

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Publications (how many and where)

Citations (how many)

Journal Impact Factor (how "good")

H-Index

G-Index

Eigenfactor

Other tools

Other measures

Weighted averages

Output per faculty

Output per capita (100,000)

Changes over time

Output by subject norm – differences among disciplines among countries

Benchmarking by institution

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How do you Count?

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COMMON COUNTING

- Number of articles published per author
- Number of citations per article
- Number of self-citations

UNCOMMON COUNTING

- Number of joint articles
- Number of articles that are not cited
- Number of articles or citations based on size of faculty; size of population

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Publications and Citations from Standard Sources

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"Citations are part of the formal accounting process of science, documenting the origin of research streams over time" (Judge, et.al. (2007) *Acad Mgmt J*. 491)

Web Of Science (WOS) – Sept 2008 >10,000 journals (years of coverage depends on subscription); in Cited reference search, references from ALL indexed items are extracted and listed regardless of whether the items are indexed by WOS. Errors are included

SCOPUS – Sept 2008 > 15,000 journals, proceedings with citations from 1996; Cited references are only for items indexed by Scopus

Both tools include affiliation and are adding name authority; both have standard fields and analysis tools

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Impact on Citations

What and Where You Publish

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Discipline – Hard sciences are better covered in standard CIs than computer and social sciences and humanities

Source of publication – Journals indexed by WOS or SCOPUS

Format – Article, proceedings, book, chapter

Location – Is there an East Asian effect?

Language – English is the language of science but not social sciences and humanities

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Average Citation Rates for papers published by field, 1998-2008

Essential Science Indicators

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Fields	1998	2001	2004	2007	All Years
All Fields	17.27	14.43	8.94	1.60	9.56
Computer Science	6.97	5.75	2.44	.53	3.00
Econ & business	9.98	7.21	4.33	.55	4.91
Psychiatry/Psychology	17.75	14.80	8.73	1.22	9.52
Social Science, general	7.37	5.98	3.89	.58	3.99
Clinical Medicine	*20.10*	*17.16*	*11.15*	*1.97*	*11.61*
Molecular Biology/Genetics	*45.63*	*37.09*	*21.95*	*3.90*	*24.54*
Mathematics	*5.65*	*4.29*	*2.72*	*.47*	*2.95*

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Impact on Citations Language

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- CI publications are primarily in English
- Non-English CI publications have low impact
- Social Sciences and Humanities are often published in local language publications which are not indexed
- English is the language of science

http://www.sinoss.com - Statistics Datasheet - Sinoss.com - Micr...

Ordered By Number of Articles(Papers)

University	Articles	Articles Pulished Aborad
Renmin University Of China	3726	58
Wuhan University	2411	63
East China Normal University	2295	31
Fudan University	1982	26
Zhejiang University	1754	27
Nanjing Normal University	1696	34
Peking University	1605	13
Zhongnan University Of Economics and Law	1575	7
Jiangxi University Of Economics and Finance	1488	9
Xiamen University	1471	15

From Information Network of Humanities and Social Sciences in Chinese Universities, searched 4 Nov 2008

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Impact on Citations

What and Where You Publish

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Discipline – Hard sciences are better covered in standard CIs than computer and social sciences and humanities

Source of publication – Journals indexed by WOS or SCOPUS

Format – Article, proceeding, book, chapter

Location – Is there an East Asian effect?

Language – English is the language of science but not social sciences and humanities

Type of publications – Review articles are highly cited; editorials, letters, news may not be included

CAVEAT: Today's scientific communications come in many formats; journals, proceedings, books, open access, websites

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Comparing WOS and SCOPUS

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WOS

General Search – add address, if known; topic; date

Limit by detailed subject, institution, country, document type, source

Use Name Lookup – not useful

Try http://www.reacherid.com
Requires self registration

Caveat: Very few have registered

Cited Reference Search
Need to know articles
At author level, need CV

SCOPUS

One search interface – author and affiliation

Limit by country, institution, subject

Have to do basic search to include year

Scopus tries to match names to create an authority file; check names you know and let SCOPUS know the problems

At author level, the exact affiliation, school and department will help as will CV

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Comparison of WOS and SCOPUS by Numbers

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	WOS	SCOPUS
Date range	Depends on subscription	Cited references from 1996; adding back
Cited references	700 million	350 million
Unique articles	40.5 million	34.6 million
% non-Science (J)	21%	3%
Number of journals (RAP) [32000 journals]	Over 10,000	Appx 17000
Asia-Pacific Journals (WOS)	Just added >600	

From Peter Jacso talk at WOS users group meeting 8/2008

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Web Of Science
WOS

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GENERAL SEARCH

CONTENT

Science Citation Index-e (1900) SMU from 2000

Social Science Citation Index (1956) SMU from 1980 (27% articles)

Arts & Humanities Citation Index (1975) SMU from 1998

Citation network mapping

Trialing Conference Proceedings (1990)

ANALYSIS (in rank order)

Subject Area

Document Type

Authors

Source Titles

Institutions (Co-authors)

Countries

Cited Reference Search

CONTENT :Any work cited by a General Search article

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Web Of Science Analysis of SMU

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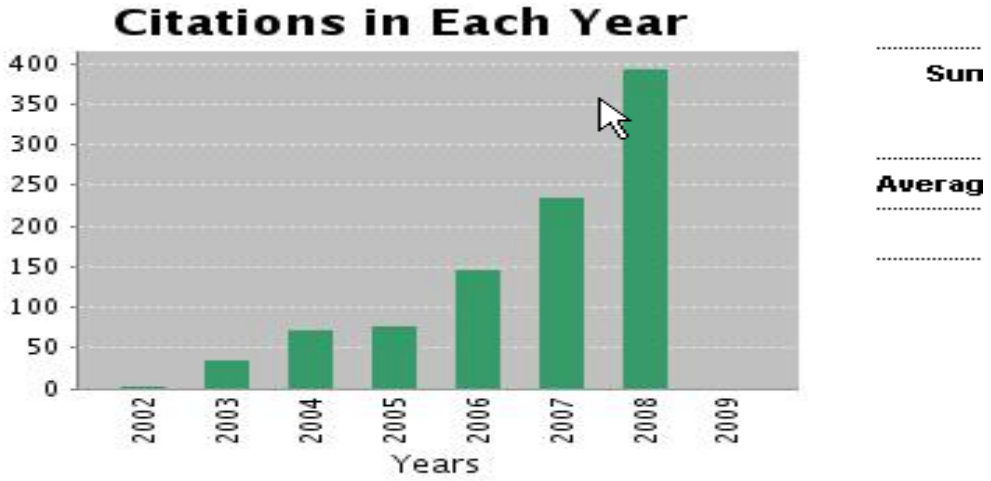
CATEGORY	Count
Subject	24-11/2008
Economics	90
Management	60
Ops Research/Mgt Sci	53
Comp Sci/Info Sys	46
Source Title	
Lecture Notes in Comp	28
Econ Letters	8
J Applied Psych	8
J of Banking & Finance	7

DB	Yr	Articles	Cites	Cites/ Article	H Index
SCI	'00	210	595	2.8	11
SSCI	'80	278	575	2.07	11
A&H	'98	12	7	.58	1
ALL		417	964	2.3	13



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SCOPUS

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Includes more journals and proceedings then WOS, pre-pub Elsevier articles

Inclusion based on:

- Peer reviewed
- Strength of editorial board and reviewers
- Published at least one time a year
- English language abstracts and references

Includes 4 databases:

Health Science, Physical Sciences, Life Sciences, Social Sciences

Citations added from 1996

Author and affiliation searches

Analysis of citing journals

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SCOPUS Affiliation
SMU

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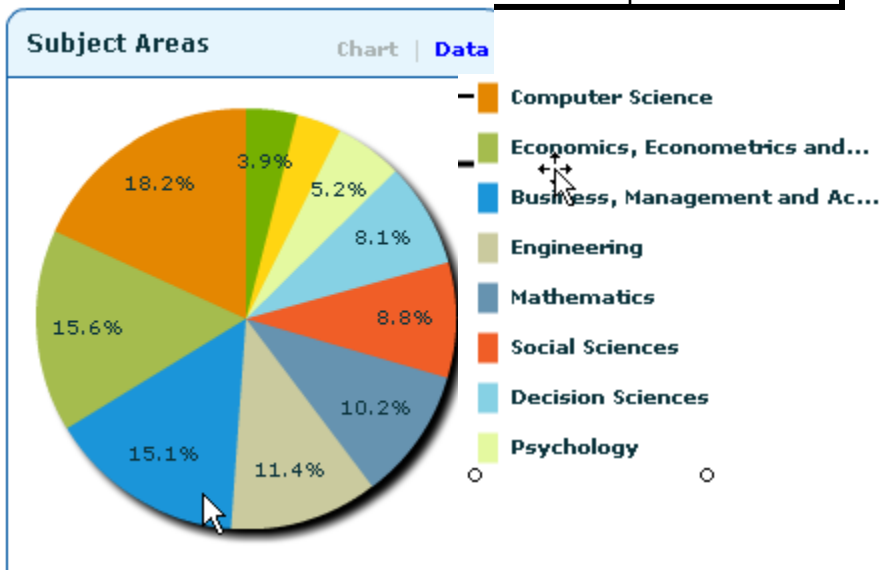
CATEGORY	
Subject	24/11/08
Computer Science	189
Economics and Finance	162
Bus, Mgmt, Acctg	157
Source Title	
Lecture Notes in Comp	38
Human Systems Mgmt	10
J of Banking & Finance	9
Economic Letters	8
J of Applied Finance	8

Category	Articles	Cites	H Index
All Science	323	702	12
Social Sci	390	950	12
A & H	4	2	1
ALL	690	1349	15



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The Pull of Google Scholar

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A Dutch academic just introduced me to this impact factor calculating website. I think he uses it to gauge the overall impact his research institute is having. You have to download the software.

http://www.harzing.com/resources.htm#/pop.htm

Discussion of the H-index explains why wider coverage than current citation indices matters:

http://en.wikipedia.org/wiki/H-index

It probably covers more broadly than some of the other impact factors, as it uses Google Scholar to get citations of not just journal papers, but books, conference and working papers. Then it calculates using some mathematical factors (in addition to absolute numbers of citations). Thus, I believe it may be best used not as a "screening out" tool but rather as a "screening in" tool, i.e., those whose works are covered in the broader sphere of academia.?(faculty email, Sept 2008)

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Google Scholar as a Research Tool

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All the pitfalls of a google search

Can do author name search in advanced search

Includes books

PLUS

No authority control on name

Includes websites, syllabi, multiple entries, false hits

No analysis tools

- Manually check each entry and count citations

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Google Scholar as a Research Tool

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Title: **Estimating Standard Errors** in Finance…

Author: M A Petersen

Review of Financial Studies

Affiliation: Northwestern University

Pub Date: GS 2008 (actual date June 2008)

Number of Citations: **381**

(searched 26 Sept 2008)

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Google Scholar using HARZING

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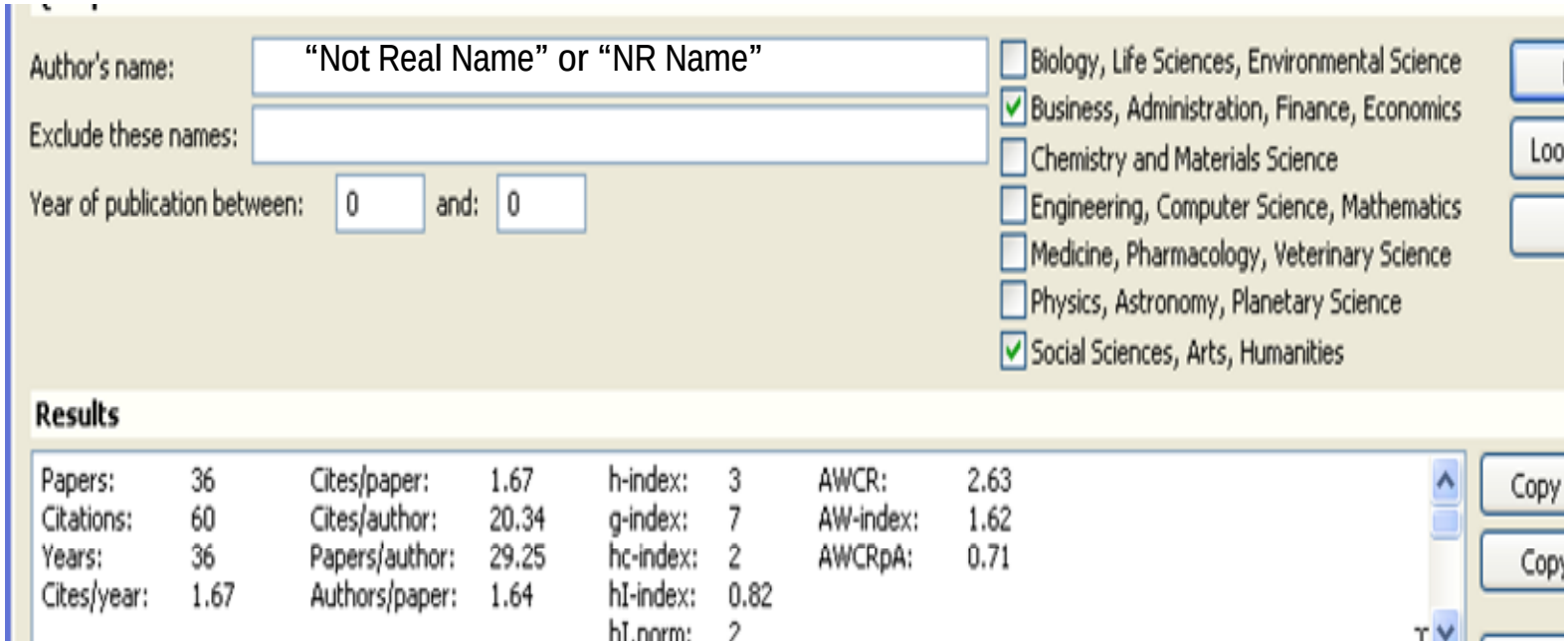
GOOGLE SCHOLAR Author Analysis



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Using Harzing http://www.harzing.com/pop.htm

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Scholars' Evaluation of Google Scholar (GS)

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"The use of ***Scopus*** and GS, in addition to WoS, helps reveal a more accurate and comprehensive picture of the scholarly impact of authors. BUT … The WoS data took about 100 hours of collecting and processing time, *Scopus* consumed 200 hours, and GS a grueling **3,000** hours"

Meho, L. & Yang, K. 2007. Impact of data sources on citation counts and rankings of LIS faculty: Web of science versus Scopus and Google Scholar. JASIST 58(13), 2105 – 2125

Ruth's Caveat: Do the math

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Ruth's Evaluation of Google Scholar

	WOS	ELSEVIER SCOPUS	GOOGLE SCHOLAR
Access	**Subscription**	**Subscription**	**Free**
Coverage	>10000 selected scholarly journals	17000 selected scholarly journals, conference proceedings	Generally articles
Time	Varies by subscription (1900-)	1996 for citations	Not stated
Who uses	**Top Tier institutions**	**Scientific institutions;**	**Anyone**
Quality'	**The standard source; Governments, Research Institutions**	**Times Higher Education**	**No authority**
Citations	**Citations included from non-WOS journals in cited references**	**Only SCOPUS citations**	**Not stated; web harvesting**
Name Identity	**Building Name Authority Self Register**	**Building Name Authority Automatically- needs clean-up**	**No authority; no way to deal with common names**
Add-ons	**Analysis tools; ESI, JCR**	**Analysis tools**	**Harzing's Publish or Perish**
Notes:	**EXCLUDES in General Search: Books, book chapters, theses, working papers, conference papers, reports INCLUDES Analysis for article, author, journal, etc**	**EXCLUDES cites from publications not covered within SCOPUS content INCLUDES Analysis for author, article, journal, institution**	**INCLUDES: Guides, Notes, Syllabi, non-reviewed articles; best for young authors; individual use with extensive data cleansing No affiliation searching**

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Identity Crisis
Asian Names

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SCOPUS and SSCI

Example 1:

I am looking for the articles and citations for Li Y from Taiwan. I think he publishes in the area of computer sciences

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Identity Crisis
Too Many Names

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Example1 : Author Li Y*

ISI Total		28805
Limit address toTaiwan		560
Limit by subject(?)		62
Add institution (Ntl Chiao Tung)		104
Find middle initial	Li YM	45
Check CV		
Li YM	Ntl Chiao Tung Univ, Mgmt	2
CITED REFERENCES:		0

SOLUTION: Manually check website

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Identity Crisis - Asian Names Too Many Variations

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SSCI	Articles	Cites
Name AB	3	3
Boh NA	17	30

In cited reference

Name AB	70
BOh NA	83

SCOPUS	Articles	Cites
Name AB	3	2
Boh, N	1	0
Boh, NA	1	23

General: H Index =3

Cited Ref: H Index =5

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Identity Crisis
Asian Names

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GOOGLE SCHOLAR Author Analysis (made up author:

NAME Aik Boh)

Variations:

AB Name

NA Boh

Neme Boh

AikB Name

Results

Papers:	112	Cites/paper:	4.42	h-index:	11
Citations:	495	Cites/author:	275.47	g-index:	19
Years:	40	Papers/author:	75.54	hc-index:	4
Cites/year:	12.38	Authors/paper:	1.93	hI-index:	5.26
				hI,norm:	8

Using Harzing http://www.harzing.com/pop.htm

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Author ID

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ISIHighlyCited.com SM

WELCOME HELP LOGOFF

★ Lin, Yi-Bing

Home > Browse > Results > Biography

ISI Author Publication Number:	**A0096-2006-L**
ISI Rating:	**Highly Cited**
ISI Assigned Category:	**Computer Science**
ISI Indexed Name:	**LIN YB** **LIN**
ISI Notes:	

Contact Information

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National Chiao Tung University
1001 Ta Hsueh Road
Hsinchu, Taiwan, 30050, Taiwan
Telephone: +886-930067071
Fax Number:
E-mail: liny@csie.nctu.edu.tw
URL: http://liny.csie.nctu.edu.tw

Personal Information

Date of Birth:	10/26/1961
City, State/Province, Country of Birth:	Taichung, Taiwan
Citizenship(s):	Taiwan
Language(s):	Chinese, English, Taiwanese

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Specialized Tools
ACM Portal

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Disambiguation of author names …

ACM Launches Beta Version of Author Profile Pages in Digital Library

Author Profile

New feature includes bibliometrics and offers quick view of authors' contributions to the field.

Learn more, read press release.

www.acm.org

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How to Measure Quality of Research

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It was suggested that the library identify top-tier journals in each discipline, reporting on % publications in top-tier journals, benchmarking our research productivity/quality against other universities.

Could we generate a "top 20" list in each discipline by the impact factor of each journal and validate with the Schools to create a "final" list to use to deriving the % top-tier publications indicator?

How do we to gather the benchmark data from other universities -- could we use the SCI databases, and count publicly available faculty listings?

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Journal Impact Facts and Questions

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Computed annually in JCR

Journal list and scores may vary year on year

Impact score depends on category

Impact rank depends on number of journals in category

Are we interested in the impact at the time the article was published? Over a variable time period?

What about the impact of the citing journals?

Do we care about the reputation of the citing institutions?

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Calculating the Impact Factor in JCR (Current)

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Number of citations received in current year (Y)
to articles published in years (Y-1 + Y-2)
Number of citable documents published in years Y-1 + Y-2

Example: *Journal of Biomedical Science (JCR 2007)*

Cites in 2007 to articles from:	Articles published in:
2006 = 151	2006 = 78
2005 = 181	2005 = 86
Sum = 332	Sum = 164

Calculation : Cites 332 = **2.024**
Articles 164

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Journal Impact Factor
J Biomed Sci 2007

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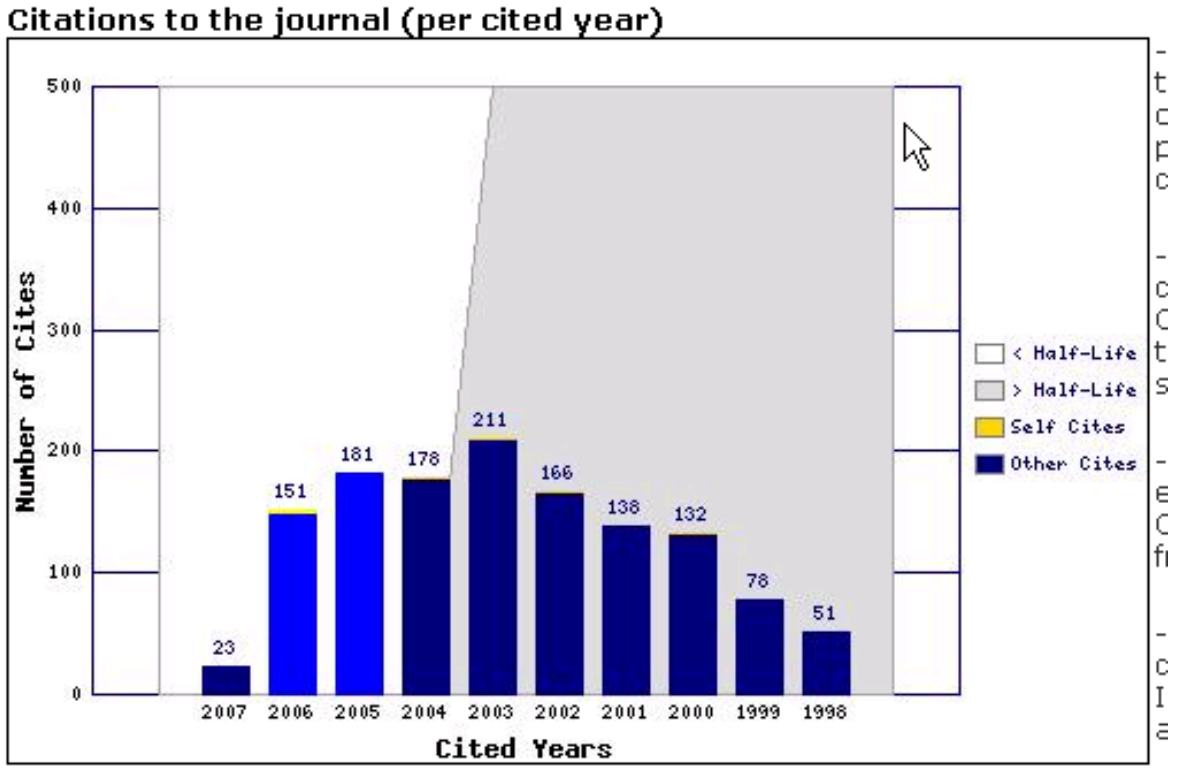
Journal Title	Total Cites	Impact Factor	Articles	Cited Half Life
J Biomed Sci	1379	2.024	72	4.7



JCR 2007

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JCR Metrics

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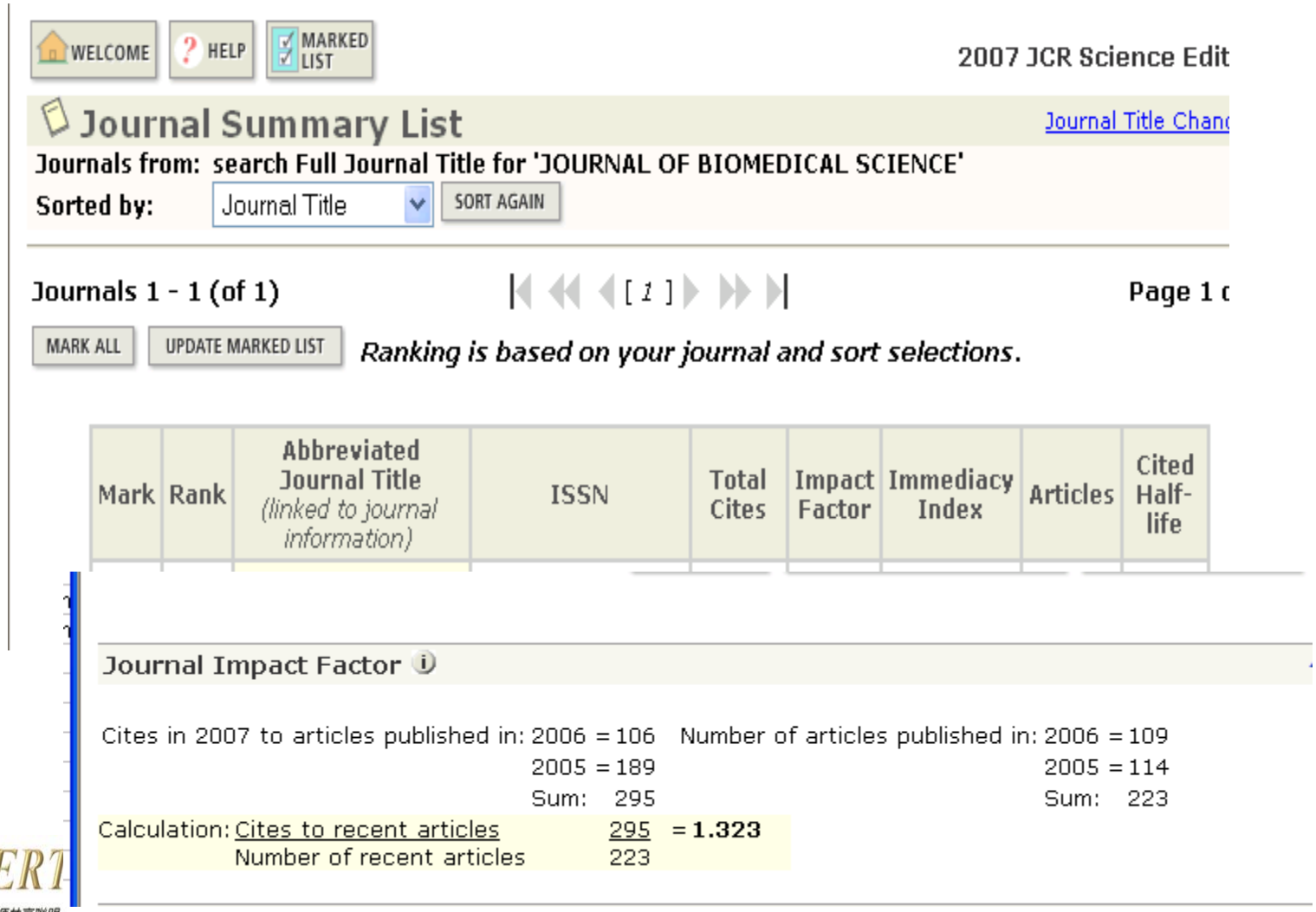

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Journal Impact Factor Comparing Categories

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JCR Subject Category	Median	Avg	# of Journals
LAW (*Harvard Law Review 5.859)*	.87	1.23	100
ECONOMICS (*J of Political Economy 4.190)*	.65	.99	191
CELL BIOLOGY (*Cell 29.887)*	2.98	5.60	156

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Metrics – H, G, E and more

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H Index removes effect of a few highly cited articles
- Understates highly cited articles
- Easy to compute
- Score varies by database

G Index emphasizes highly cited articles (Egghe, 2006)
- Is always higher then H
- Needs more papers for meaningful score and more math ability to calculate

Eigenfactor (http://www.eigenfactor.org/methods.htm)
- Journals are considered to be influential if they are cited often by other influential journals; mathematical calculation

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New Metrics: H-Index

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Calculation:

Researcher A has an h-index of 7 if 7 of his 26 papers have at least 7 citations each and the other 19 papers have not more than 7 citations each. (Hirsch, JE Proceedings of the National Academy of Science (2005) issue 16569)

A's H index=7 out of 26 papers on Scopus

RANK	CITES	YR
1	48	2000
2	44	1999
3	43	2000
4	30	2004
5	13	2000
6	12	2002
7	11	2004
8	6	2005
19	0	…

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New Metrics – H Index

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Author	ISI WOS (general search)	SCOPUS	GS *	Ruth's notes
A	12	4	13	>30 yrs; Econ
B	5	7	10	10 yrs; Operations Mgmt
C	4	2	5	>25 yrs; LIS
D	3	1	11	>35 yrs; Bus and Intl Relations
E	3	5	*	5 yrs; Comp Sci (can't identify)

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APPLICATIONS

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- Bibliometrics used at University level
- Bibliometrics used in University rankings
- Bibliometrics used in Country Rankings

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Case Study
New University

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Research Goals and Key Performance Indicators

Make a fundamental Investment in University's research and scholarly capabilities

- Total number of publications by full time faculty
- Number of publications per full time faculty (ex. Lecturers)
- Number of citations at University level for full time faculty

Build a faculty of international distinction and promise

- Referred publications per tenure track faculty
- Number of citations at University level per full time faculty

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Case Study
New university

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Research Metrics

Refereed Publications by Standing Faculty
Citation Count
Total Number of Publications
Research Active Faculty

Research Categories

By School
By Rank (i.e. Asst Prof)
By Tenure or Teaching

ISSUES: Quality vs Quantity
Legacy citations from senior faculty/ visiting faculty

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Case Study

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TREND	INDICATOR	FY 1	FY 2	FY3 Target
	# Full time faculty (FTF)	300	340	400
- 5%	Total # of publications	1000	950	1200
-17 %	Publications /FTF	3.33	2.75	3.00
+50%	Referred publication/FTF	1	1.5	1.5
+14%	Total Citation Count	14000	16000	19000

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Case Study

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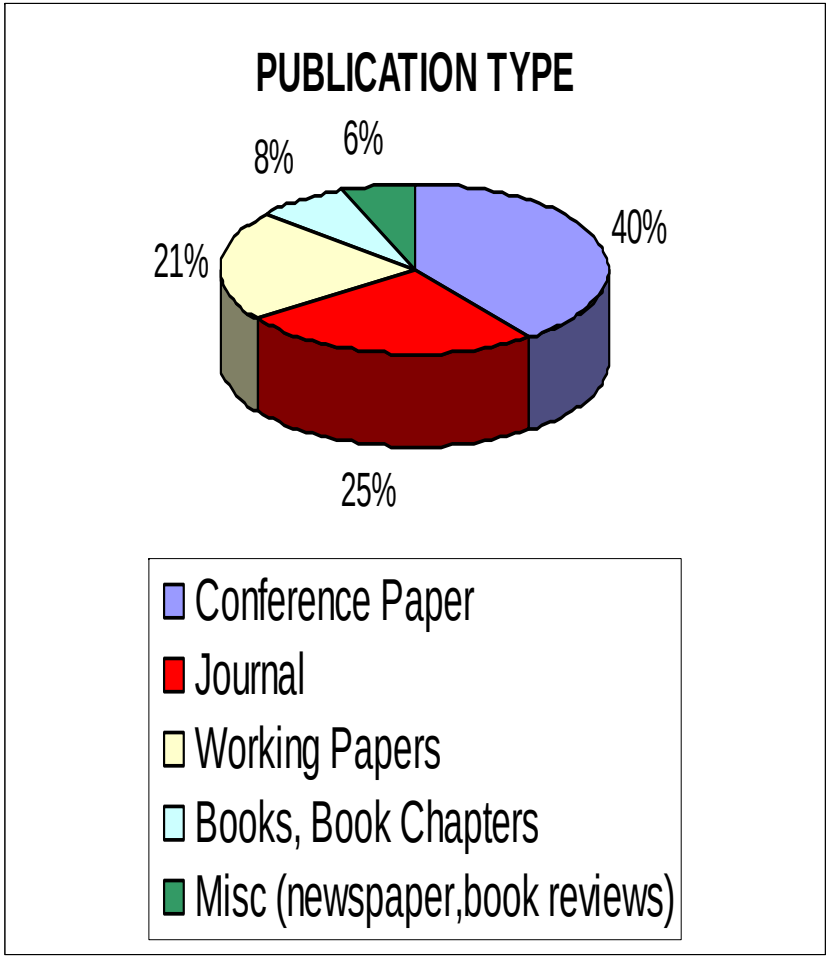
Publication by Type	Number	Percent
Conference Paper	380	40%
Scholarly Journal	238	25%
Working Paper	200	21%
Books, chapters	76	8%
Misc	56	6%



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APPLICATIONS
Bibliometrics Used in University Rankings

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THE- QS -- Times Higher Education World University Rankings)

Shanghai Jioa Tong -- Academic Ranking of World Universities

HEEACT – Worldwide University Ranking for Scientific Papers

See: 2008 International Symposiam: Ranking in Higher Education on the Global and National Stages, HEEACT

http://www.heeact.edu.tw/conference2008/

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APPLICATIONS
Bibliometrics Used in University Rankings

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THE-QS World University Rankings - 2008

20% of ranking based on citations per faculty

Total Citation count for the past 5 years from SCOPUS (2007-)

Total Number of full time equivalent faculty (FTE)

Bias toward medical and life sciences and teaching in English

http://www.topuniversities.com/

Scopus as of 23 June 2008

Comp	Cite/Fac	University Name
5	1	Cal Tech
17	2	Stanford
9	3	MIT
36	4	UC Berkeley
1	5	Harvard
12	6	Princeton
58	7	UC San Diego
41	8	Univ Toronto
30	9	UCLA
13	10	Johns Hopkins

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Bibliometrics Used in University Rankings

Shanghai Jiao Tong University – Academic Ranking of World Universities

Ranks academic or research performance, including:

highly cited researchers from 21 WOS Categories (20%),

articles indexed in SCI-e & SSCI in the previous year (20% with additional weight for SSCI)

per capita academic performance of an institution (weighted scores of all indicators divided by FTE academic staff (10%)

http://www.arwu.org/rank2008/EN2008.htm 14 August 2008

Bibliometrics Used in Rankings

HEEACT – Performance Ranking of Scientific Papers

Table 1: The Criteria, Indicators, and Their Respective Weightings Used for the Overall Performance Based Ranking

Criteria	2008 Overall Performance Indicators	Weighting	
Research productivity	Number of articles of the last 11 years (1997-2007)	10	20
	Number of articles of the current year (2007)	10	
Research impact	Number of citations of the last 11 years (1997-2007)	10	30
	Number of citations of the last 2 years (2006-2007)	10	
	Average number of citations of the last 11 years (1997-2007)	10	
Research excellence	H-index of the last 2 years (2006-2007)	20	50
	Number of Highly Cited Papers (1997-2007)	15	
	Number of articles of the current year in high-impact journals (2007)	15	

Historical publication and citation data is from ESI

Current data is from SCI and SSCI; high impact journals from JCR
http://ranking.heeact.edu.tw/en-us/2008/Page/Methodology

Comparative World University Rankings Using Bibliometrics

SHANGHAI Jiao Tong (40% bibliometrics)	**HEEACT** (100% bibliometrics)	**THE-QS** (20% bibliometrics)
Harvard	Harvard	Harvard
Stanford	Johns Hopkins	Yale
U C – Berkeley	Stanford	Cambridge
Cambridge	Univ Washington	Oxford
MIT	UCLA	Cal Inst Tech
Cal Inst Tech	UC– Berkeley	Imperial Col London (H27)
Columbia	Univ Michigan	Univ Col London (H20)
Princeton	MIT	Univ Chicago
Univ Chicago	UC – San Francisco	MIT
Oxford	UC – San Diego	Columbia

Comparative Asian* Rankings Using Bibliometrics

Shanghai Jioa Tong - without* Australia, Israel	**HEEACT** ***without** Australia, Israel	**THE – QS (no A-P list)** *taken from general list
Tokyo	Tokyo	Tokyo
Kyoto U	Kyoto	Kyoto
Osaka	Osaka	Univ Hong Kong
Tohoku	Tohoku	Ntl Univ Singapore
Kyushu	Seoul Ntl Univ	HKUST
Nagoya	Ntl Univ Singapore	Chinese U (HK)
Ntl Univ Singapore	Nagoya	Osaka
Tokyo Inst Tech	Kyushu	Peking U
Hokaido	Ntl Univ Taiwan (141 World; 15 A-P)	Seoul Ntl Univ
Ntl Univ Taiwan (152-200 World; 17-22 Asia-Pac)	Tokyo Inst Tech	Tsinghua (15 Ntl Taiwan U)

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APPLICATIONS
Country Bibliometrics
The U.S. Myth (1995-2005)

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Worldwide S&E output grew at an average annual rate of 2.3%.

Total U.S. output grew 0.6% a year compared to 1.8% for the EU and 6.6% for a group of 10 Asian countries*

Asia-10 share increased from 13% to 20%. U.S. share of total world article output fell between from 34% to 29%; EU share declined from 35% to 33%,

NOTE: Asia-10 includes China (& Hong Kong) India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand

Science and Engineering Indicators, 2008 http://www.nsf.gov/statistics/seind08/c5/c5h.htm

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Country Bibliometric
% of Selected Asian Country Articles

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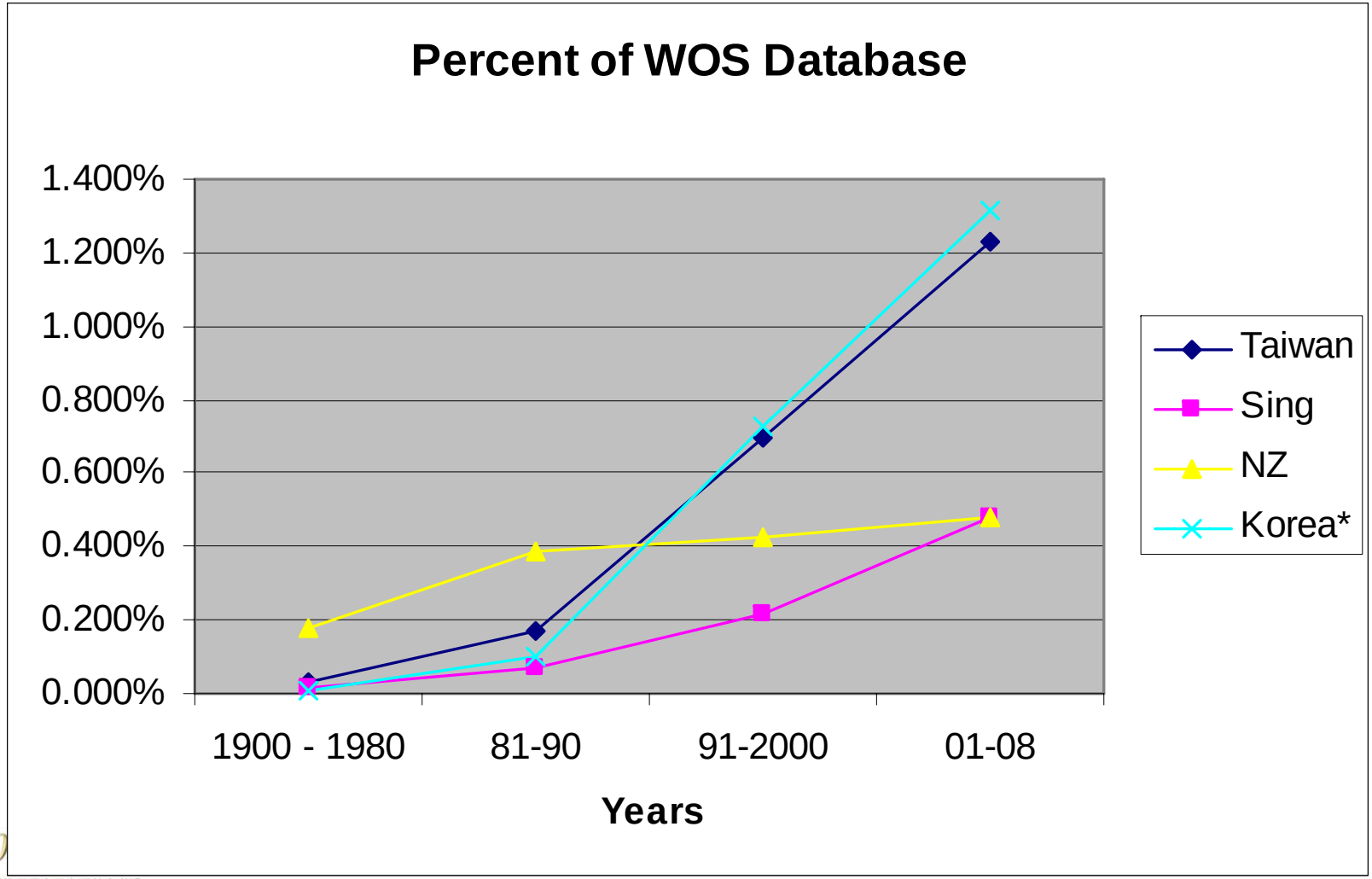

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Growth of Asian Articles is WOS

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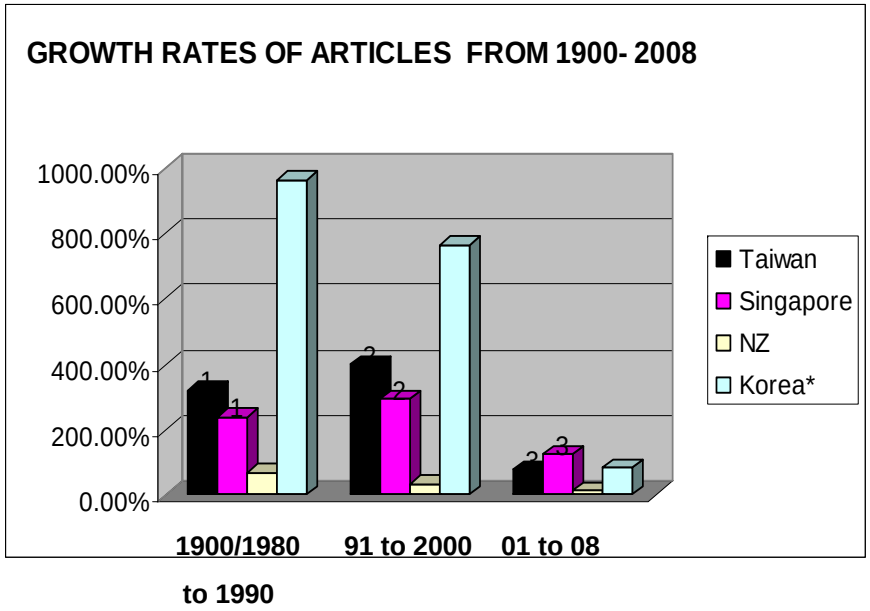
	1900 - 1980	81-90	90-20’	01-08
Taiwan	3523	14819	73881	132374
S’pore	1716	5832	23027	51617
N Z	19892	33815	45089	51392
Korea	838	8931	77336	141452
WOS ‘000	10999.7	8686,6	10652.4	10740.3

% Change among decades



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Country Metrics
Leading Subjects in Taiwan

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1980	#	% Output
Plant Science	37	6.42
Intl Relations	36	6.25
Pharmacology	36	6.25
Political Science	36	6.25

2007	#	% Output
Electrical Eng	2279	11.11
Physics	1706	8.32
Materials Science	1403	6.84
Optics	713	3.48
Plant Sci	*234*	*1.14*

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Searched on WOS September 2008

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scienceWATCH

Science in Taiwan 2002-2006

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Field	% Papers from TAIWAN	Relative Cites Impact to World
Engineering	3.96	-22
Materials Sci	3.35	-9
Physics	2.38	-21
ALL Papers	% cites 1.69	1
Agricultural Sci	1.31	+1

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Source of Rankings Data
Essential Science Indications

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For influence and impact measures, *Essential Science Indicators* employs both total citation counts and cites per paper scores. The former reveals gross influence while the latter shows weighted influence, also called impact. It is important to recognize that the data in *Essential Science Indicators* are limited to Thomson Scientific-indexed journal articles only. No books, book chapters, or articles published in journals not indexed by Thomson Scientific are taken into account here, either in terms of publication or citation counts.

Level of Aggregation

Citation Ranking:
Scientists
Institutions
Countries
Journals
Most cited papers
Highly cited papers (10
Hot papers (2 yrs)

Benchmarking:

By broad subject area
User-defined topic

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Using Papers and Citations to Track Specific Topics

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RESEARCH FRONTS RANKINGS FOR CORPORATE GOVERNANCE

Sorted by: Citations SORT AGAIN

1 - 4 (of 4) [1] Page 1 of 1

	View	Fronts	Papers	Citations	Citations Per Paper	Mean Year
1		INTERNATIONAL CORPORATE GOVERNANCE; MANAGEMENT AFFECT FIRM VALUE; CORPORATE GOVERNANCE STANDARDS; FAMILY FIRM; FIRM PERFORMANCE	43	1,828	42.51	2004.
2		WEAK GOVERNANCE CAUSE WEAK STOCK RETURNS; CORPORATE GOVERNANCE; GOVERNANCE MECHANISMS; EQUITY PRICES; BUSY BOARDS EFFECTIVE MONITORS	12	403	33.58	2005.
3		SOFT BUDGET CONSTRAINT; ENTERPRISE RESTRUCTURING; EMERGING ECONOMIES; CORPORATE GOVERNANCE; EASTERN EUROPE	5	261	52.20	2004.
4		AMERICAN CORPORATE GOVERNANCE SYSTEM FEDERALISM; QUACK CORPORATE GOVERNANCE; STATE COMPETITION; CORPORATE LAW; ONE SMALL STATE	5	245	49.00	2004

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Country Metrics

SMU Singapore Management University

SJR SCImago Journal & Country Rank

Subject Area: Computer Science for 2007

	Country	Docu-ments	Citable Docs	Cites	Self Cites	Cites/Doc	H Index
1	China	19792	19686	858	601	0.04	74
2	USA	17277	16519	3176	1620	0.18	267
3	UK	6468	6202	991	461	0.15	121
4	Germany	5508	5333	768	383	0.14	109
10	Spain	3679	3580	443	237	0.12	71
11	Taiwan	3436	3352	292	150	0.08	69
12	Australia	2572	2484	354	142	0,14	75

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http://www.scimagojr.com Data Source: Scopus®

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Examples of Other Bibliometric Sources

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Subscription Databases

- Science Direct – search by cited author and affiliation; link to SCOPUS for citations for cited articles
- ACM Portal – Downloads and citation counts; Disambiguation of names
- Academic Search Premier and PsycInfo on Ebsco – includes citations within the databases

Sample Free Websites

- Citebase – Physics: Citations and downloads; part of Open Citation Project
- Repec – Economics and statistics; citations and downloads

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Downloads from ACM Portal

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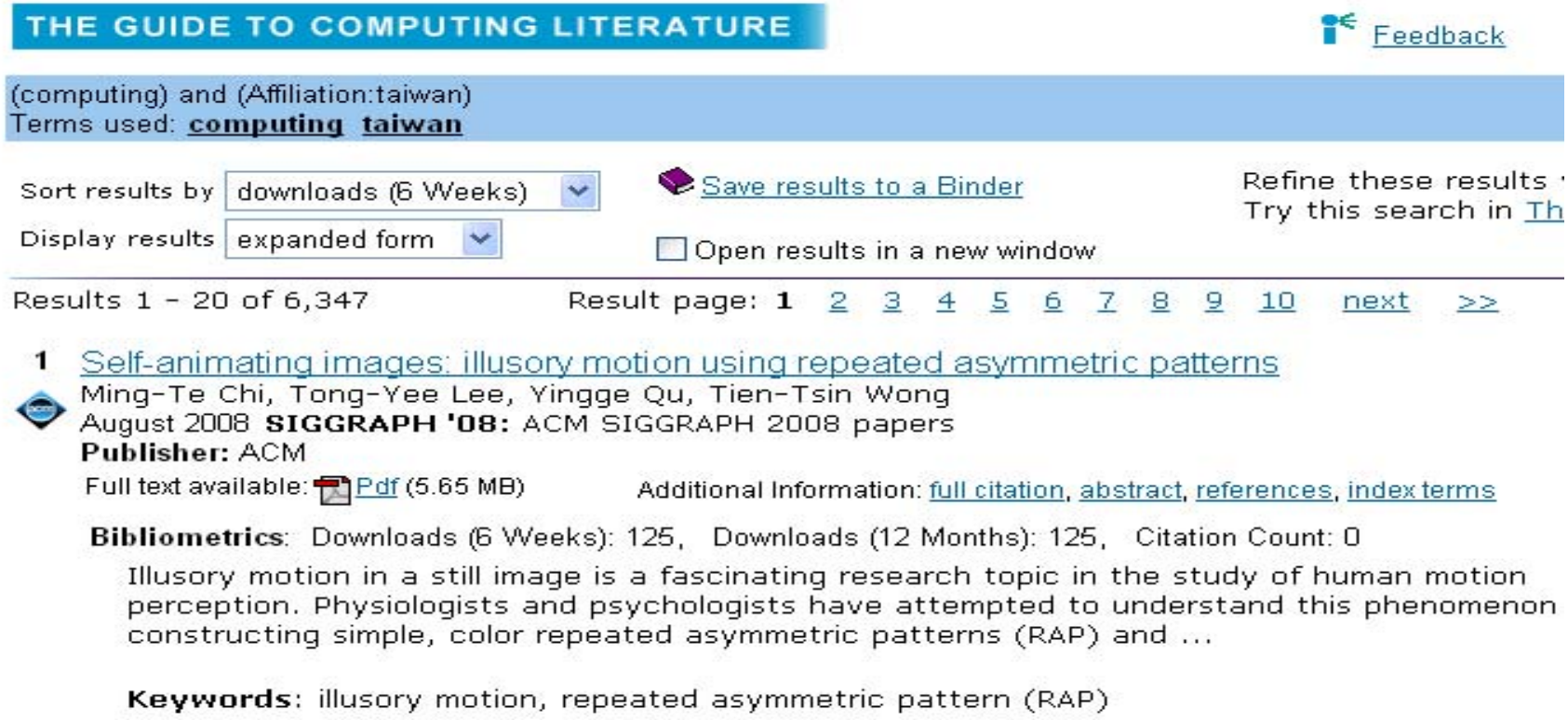
THE GUIDE TO COMPUTING LITERATURE

Feedback

(computing) and (Affiliation:taiwan)
Terms used: **computing taiwan**

Sort results by: downloads (6 Weeks)
Display results: expanded form

Save results to a Binder

Open results in a new window

Refine these results
Try this search in Th

Results 1 - 20 of 6,347 Result page: **1** 2 3 4 5 6 7 8 9 10 next >>

1 Self-animating images: illusory motion using repeated asymmetric patterns
Ming-Te Chi, Tong-Yee Lee, Yingge Qu, Tien-Tsin Wong
August 2008 **SIGGRAPH '08:** ACM SIGGRAPH 2008 papers
Publisher: ACM
Full text available: Pdf (5.65 MB) Additional Information: full citation, abstract, references, index terms

Bibliometrics: Downloads (6 Weeks): 125, Downloads (12 Months): 125, Citation Count: 0

Illusory motion in a still image is a fascinating research topic in the study of human motion perception. Physiologists and psychologists have attempted to understand this phenomenon constructing simple, color repeated asymmetric patterns (RAP) and ...

Keywords: illusory motion, repeated asymmetric pattern (RAP)

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citebase Search

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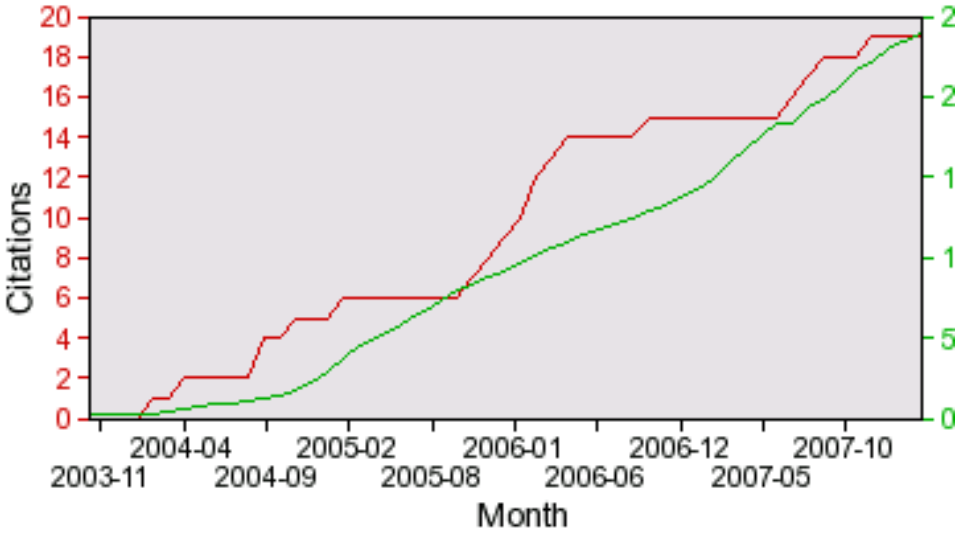
SINGAPORE MANAGEMENT UNIVERSITY

Citebase is currently only an experimental demonstration. Users are cautioned not to use it for academic evaluation yet. Citation coverage and analysis is incomplete and hit coverage and analysis is both incomplete and noisy.

Record Year between and

Rank matches by Descending Hits (Paper) Search Reset

	Citations	Downloads
To this article	19	2400
To authors (mean)	3.75	198.66



CoCEIR
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Consortium on Core Electronic Resources in T

Top Research Items

- Top Items by Citations (all works, updated daily)
  - Number of citations (recent)
  - Number of citations, weighted by simple impact factors (recent
  - Number of citations, weighted by recursive impact factors (rec
  - Number of citations, discounted by citation age (recent)
  - Number of citations, weighted by discounted impact factors (re
  - Number of citations, weighted by recursive discounted impact
- Top Items by Downloads in RePEc Services
  - Top Working Papers
  - Top Journal Articles
  - Top Software Components
  - Top Chapters
  - Top Books
- Top Items by Abstract Views in RePEc Services

http://ideas.repec.org/

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21st Century Approach

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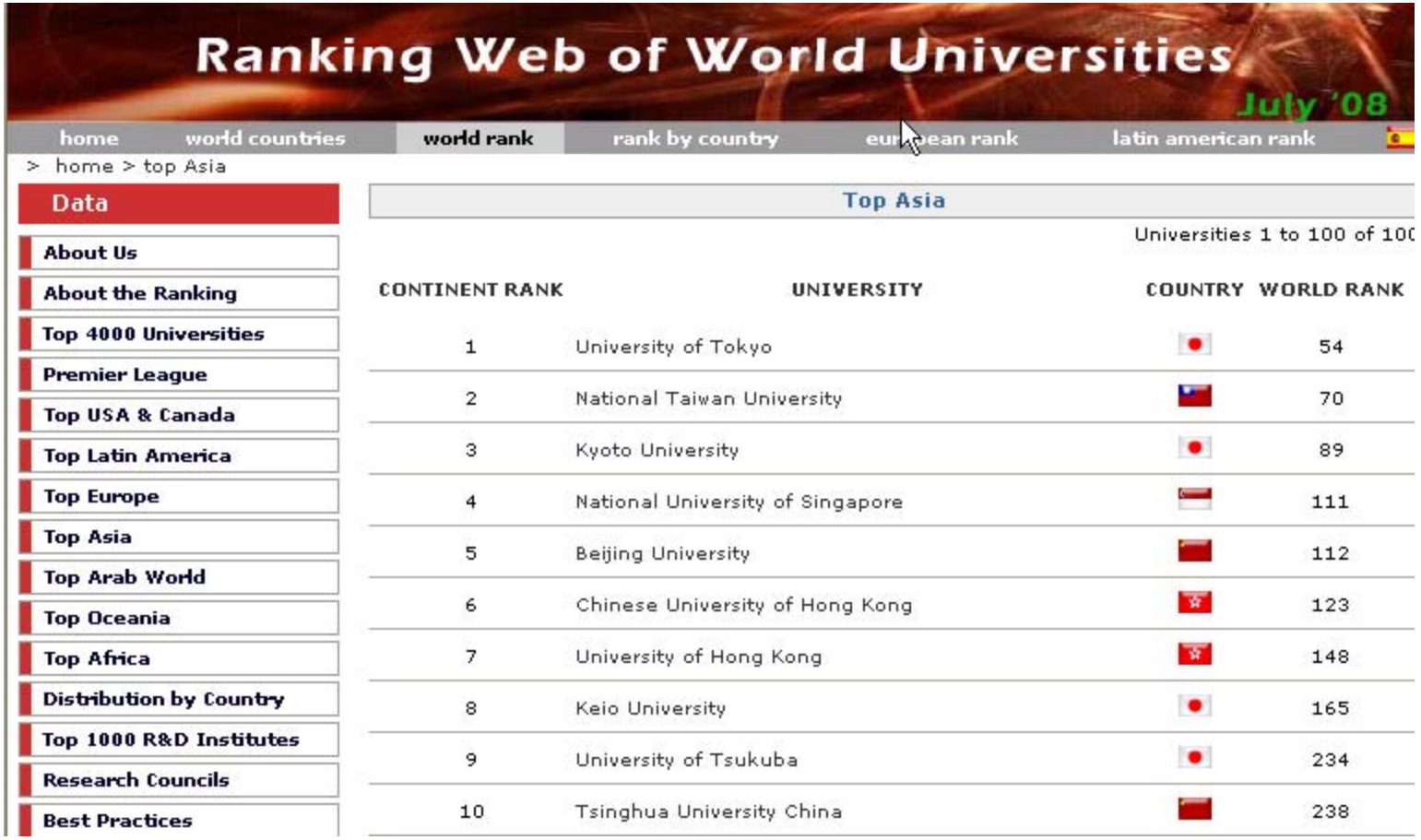

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http://www.webometrics.info/top100_continent.asp?cont=asia

Cybermetrics Lab, Consejo Superior de Investigaciones Cientifices, Spain

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Limitations

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" Therefore, as a general principle we state that optimal research evaluation is realised through a combination of metrics and peer review" (Scoping, p. 32)
http://www.hefce.ac.uk/pubs/rdreports/2007/rd18_07/rd18_07.doc

The broad consensus among bibliometric researchers is that journal impact factors should not be used as surrogates of actual citation impact (Scoping p. 34)

The report …strongly cautions against the over-reliance on citation statistics such as the impact factor and h-index (ScienceDaily July 11, 2008)

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How to Improve Citation Counting

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IT WOULD HELP OUR COUNTING IF FACULTY

- Used a middle initial
- Used the same name consistently and let us know what that was
- Registered at sites that are creating authority lists
- Included their full SMU affiliation
- Added papers to open access repositories such as new SMU DL
- Posted a list of all publications on your web site

FOR FACULTY INTERESTED IN KEEPING THEIR OWN COUNTS

- Set up database alerts (Library can help)
- Maintain a continuously updated file of citations as they are discovered
- Search the Web for items not indexed in CI databases (but remember data cleansing is required)

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CONCLUSION

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TIME IS MONEY

TIME IS PRODUCTIVITY

THERE WILL ALWAYS BE SOMETHING ELSE TO COUNT AND NEW TOOLS WITH WHICH TO COUNT

Thank you

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