Williams Centre for Learning Advancement

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THE UNIVERSITY OF MELBOURNE

Citation analysis in higher education and business disciplines

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Aims

At the end of the session, you should be able to:

- Describe the purposes and uses of citation analysis in research
- Identify the data used in citation analysis
- Describe the potential of visualisation tools used together with citation analysis
- Examine the applicability of citation analysis in exploring research in your own discipline

Teaching: *MGMT90141* Business Analysis and Decision Making

Research: Higher Education and Business disciplines;

Professional development: Developing and managing *programs*, running *workshops*, writing *guides/resources*, assisting *grants applications*, *mentoring* tutors and academics, etc

Leadership and engagement:
Chair, Staff Equity and Diversity Committee
Mentor, Alumni Mentoring Program
Member, Australia/New Zealand Quality and Accreditation Network (ANZQAN)

Angelito

Assurance of learning: AACSB accreditation, quality assurance and curriculum reviews

What is citation analysis?

Citation analysis is a way of measuring the relative importance or impact of an author, an article or a publication by counting the number of times that author, article, or publication has been cited by other works.
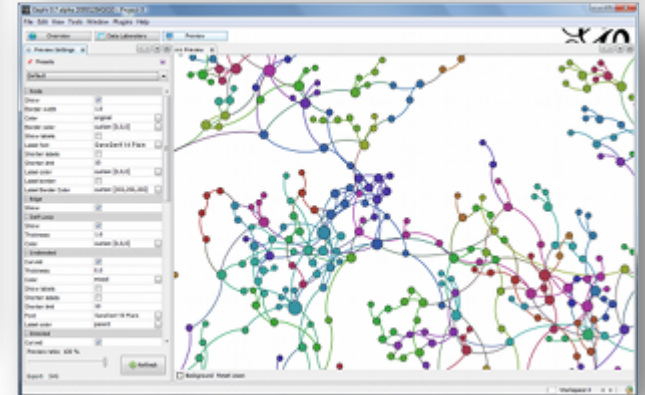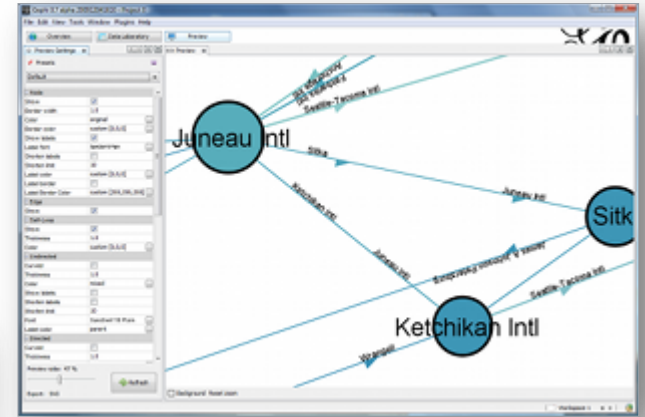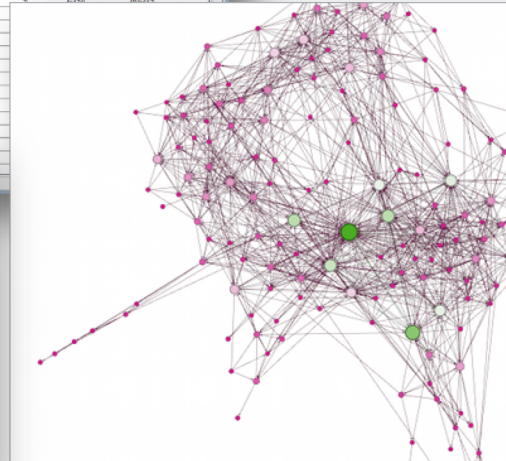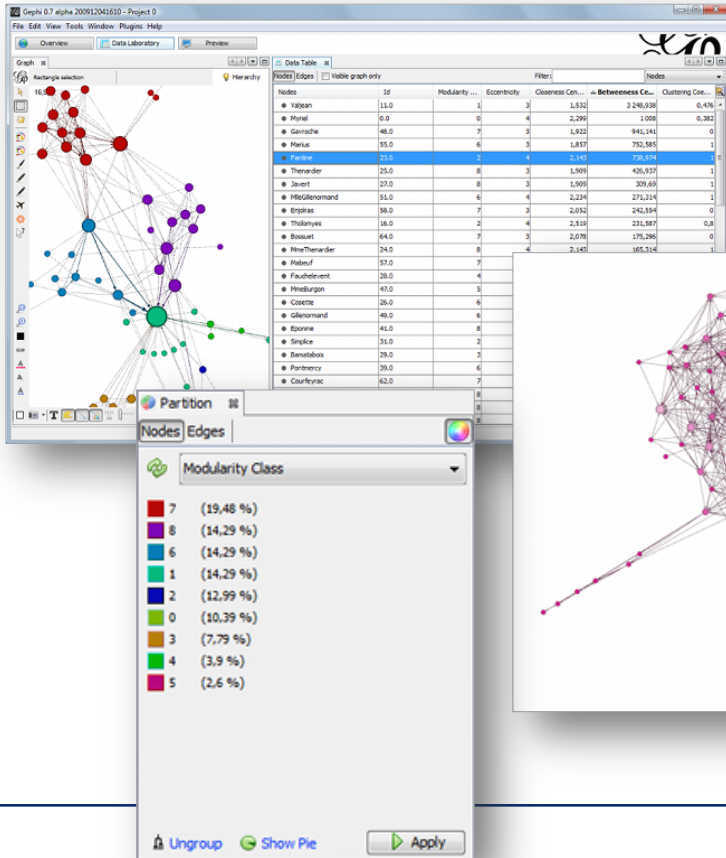
What is network analysis?

Network analysis is an investigation of interconnectedness
of items in a given population
as revealed by nodes and links between nodes.
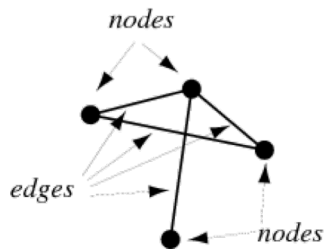
What are data visualisation tools?

any tool, platform or software to help present data more visually and meaningfully, such as detecting trends and patterns in large, complex data.

Gephi (gephi.org)

Kumu (kumu.io)

Make sense of your messy world.

Kumu makes it easy to organize complex data into relationship maps that are beautiful to look at and a pleasure to use.

- **Stakeholder mapping**
  Explore the complex web of loyalties, interests, influence, and alignment of key players around important issues.

- **Systems mapping**
  Understand and engage complex systems more effectively using systems maps and causal loop diagrams.

- **Social network mapping**
  Capture the structure of personal networks and reveal key players. Visualize the informal networks within your organization and see how work really gets done.

- **Community asset mapping**
  Keep track of the evolving relationships among community members and resources.

- **Concept mapping**
  Brainstorm complex ideas and relate individual concepts to the bigger picture. Unfold convuluted series of events using Lombardi diagrams.
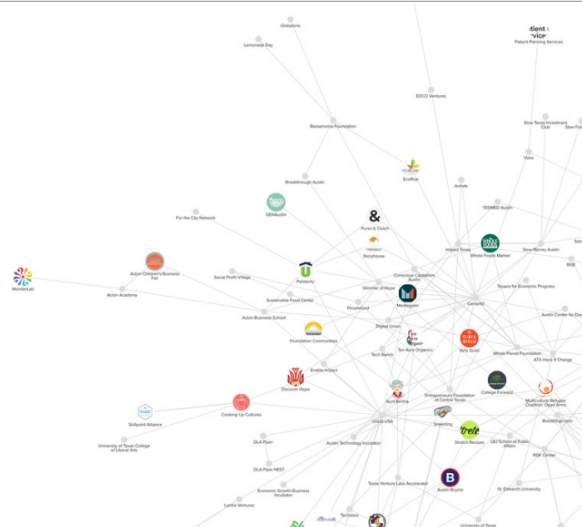
Clarity begins with Kumu.

Kumu is a powerful data visualization platform that helps you organize complex information into interactive relationship maps.

Hewlett Foundation Madison Initiative

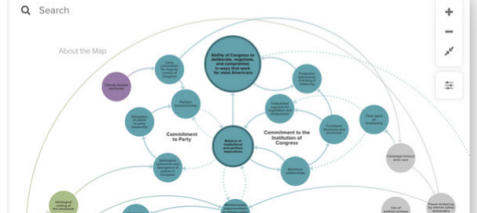**The Madison Initiative**

The goal of the Madison Initiative is to help create the conditions in which Congress and its members can deliberate, negotiate, and compromise in ways that work for most Americans. This requires that Congress represent and balance the diverse and often conflicting array of interests, ideas, and agendas of the American people; that the public believes in the
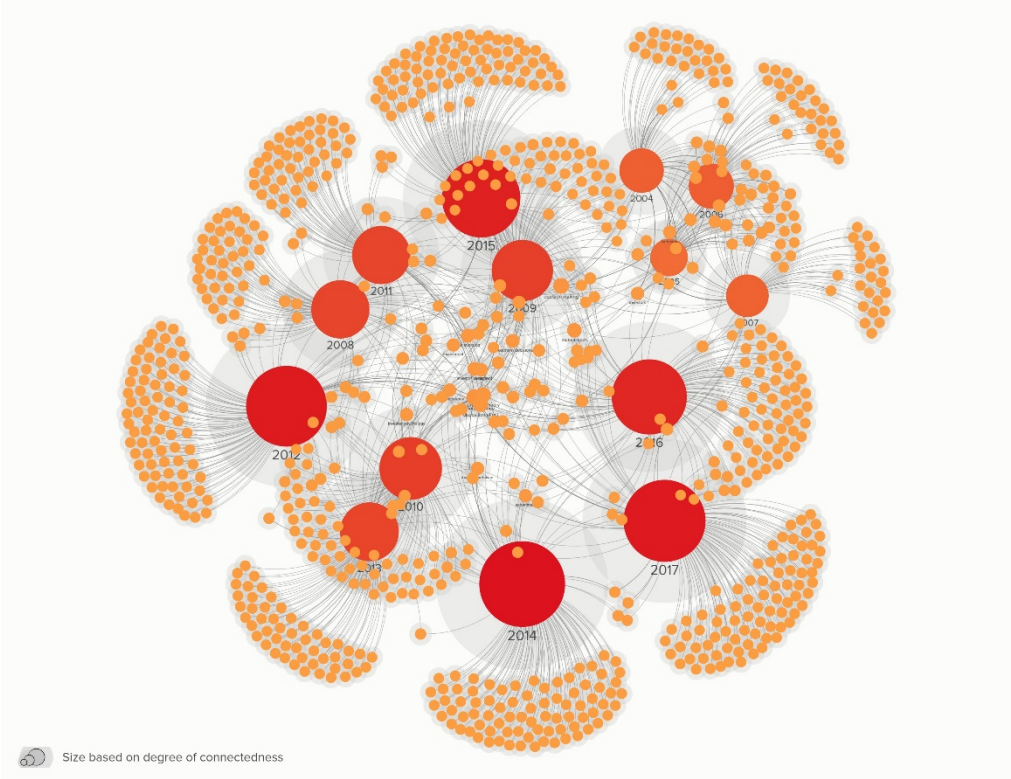
Currently working on…

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Currently working on…

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Currently working on…

Size based on degree of connectedness
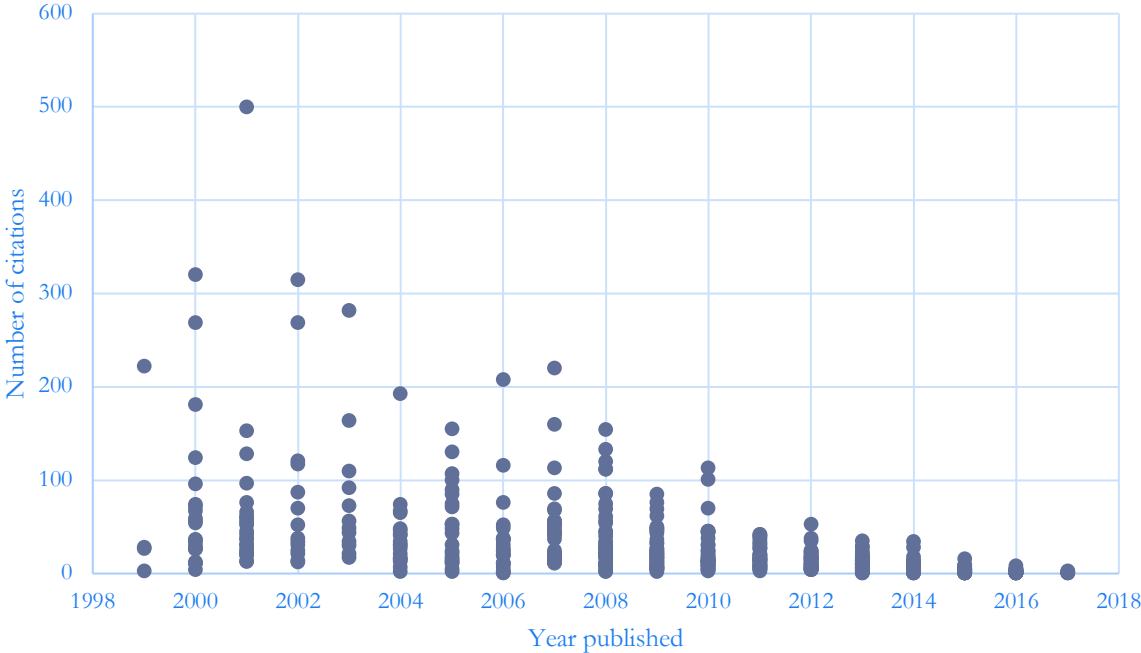
Example Application #1
Studies in Higher Education Journal

Studies in Higher Education 1976-2013: a retrospective using citation network analysis

Angelito Calma[a] & Martin Davies[b]

[a] Centre for Excellence in Learning and Teaching, Faculty of Business and Economics, The University of Melbourne, Level 5, The Spot Building, 198 Berkeley Street, Carlton, VIC 3053, Australia

[b] Melbourne Graduate School of Education, The University of Melbourne, 234 Queensberry Street, Carlton, Melbourne, VIC 3010, Australia
Published online: 11 Nov 2014.

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Studies in Higher Education 1976-2013: a retrospective using citation network analysis

- 1976-2013 data

- Web of Science database

- 1,056 academic articles

- 32,738 references

- Using Excel and Gephi

Walk-through

Figure 5. Most cited authors in *SHE* (1976–2013) as shown in Gephi.

Table 2. Most cited authors in *SHE* (1976–2013).

Author	Number of citations
Entwistle, N.	269
Marton, F.	254
Ramsden, P.	202
Biggs, J.	200
Becher, T.	164
Boud, D.	161
Barnett, R.	156
Trigwell, K.	123
Kember, D	122
Bourdieu, P.	115

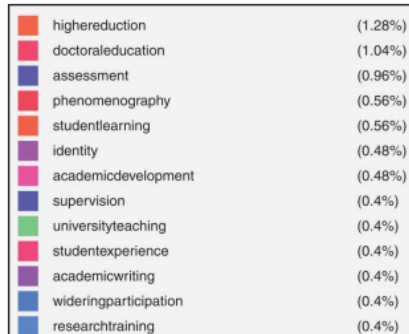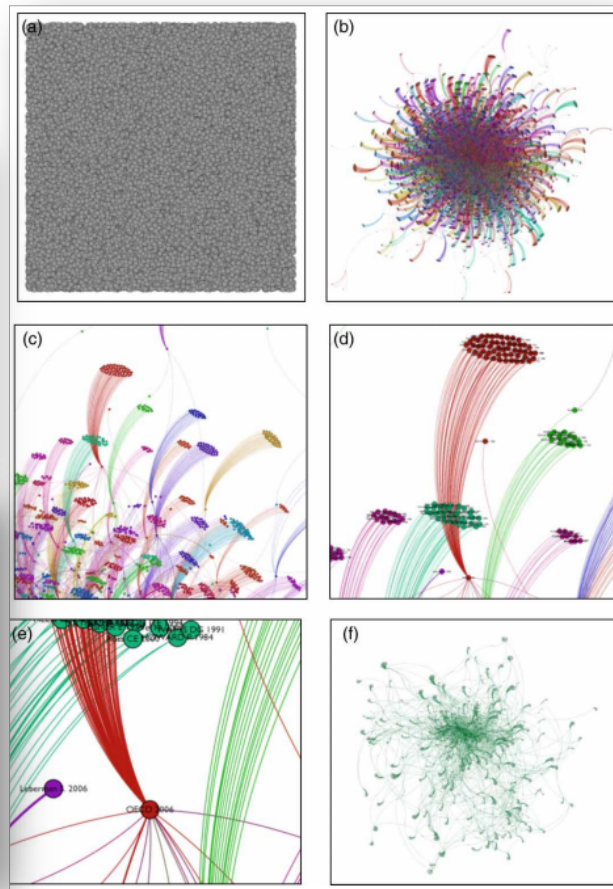|	
highereduction	(1.28%)
doctoraleducation	(1.04%)
assessment	(0.96%)
phenomenography	(0.56%)
studentlearning	(0.56%)
identity	(0.48%)
academicdevelopment	(0.48%)
supervision	(0.4%)
universityteaching	(0.4%)
studentexperience	(0.4%)
academicwriting	(0.4%)
wideringparticipation	(0.4%)
researchtraining	(0.4%)

Figure 7. Most used keywords in 218 *SHE* articles as shown in Gephi.

Selected findings

- **Richardson, Kember and Becher are the most published authors**

- **Entwistle, Marton and Ramsden are the most cited authors**

- **The most discussed topics using keywords are *doctoral education, assessment, phenomenography, student learning and identity***

- **UK and Australia have similarities in referencing leading scholars from both but USA predominantly reference other US authors and studies**

- ***academic writing*, *widening participation* and *research training* did not receive much attention but became 'hot' topics since 2010**

Example Application #2
Higher Education Journal

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Geographies of influence: a citation network analysis of *Higher Education* 1972–2014

Angelito Calma[1] · **Martin Davies**[1]

Abstract This paper provides a citation network analysis of the publications of the journal Higher Education from 1972 to 2014 inclusive. This represents nearly the entire history of the journal. It analyses the most published authors and the most cited articles, as well as the most cited authors. This data includes the highest number of publications both by institution and country of origin. 2176 articles were taken from Web of Science[TM] as a source of primary data. These articles were found to have 68,009 references. Analysis was carried out using the Web of Science[TM] online analytics tool and Excel[®]. Gephi[TM], a data visualisation and manipulation software, was then used to provide visual representations of the associated citation networks. These representations were shown to constitute "terrains" of citations or "geographies of influence"—effectively bringing to bear empirical data in support of Macfarlane's higher education research "archipelago". Nationality biases were observed between US and UK/European/Australian higher education journals. Results indicate that the most published authors throughout the journal's history are Meyer, Kember, Richardson, Enders and Prosser. Confirming earlier studies on UK and Australian journals, the five most cited authors are Entwistle, Clark, Marton, Biggs and Ramsden. The single most cited article is Clark's 1983 *Higher education system: academic organization in cross-national perspective*. The top publication years for the journal were 2012, 2009 and 2011. Results from this paper shed light into the evolving concerns of the journal and its readership, and provide a demonstration of a powerful way of analysing citation data.

✉ Angelito Calma

Geographies of influence: a citation network analysis of Higher Education 1972-2014

- 1972-2014 data
- Web of Science database
- 2,176 academic articles
- 68,009 references
- Using Excel and Gephi

Walk-through

Table 7 Top 10 most cited articles

No.	Publication year	No. of citations	% of 68,009
1	Clark, B. R. (1983). Higher education system: academic organization in cross-national perspective	109	0.160
2	Marton, F. & Säljö, R. (1976). On qualitative differences in learning (I, II): outcome and process. British Journal of Educational Psychology, v46	103	0.151
3	Slaughter S. & Leslie, L. (1997). Academic capitalism: politics, policies and the entrepreneurial university	83	0.122
4	Entwistle N. J. & Ramsden, P. (1983). Understanding student learning	82	0.121
5	Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M. (1994). The new production of knowledge: the dynamics of science and research in contemporary societies	81	0.119
6	Clark, B. R. (1998). Creating entrepreneurial universities: organizational pathways of transformation	58	
7	Becher, T. (1989). Academic tribes and territories: intellectual enquiry and	57	
		52	
	teaching: the	46	
		45	

Fig. 3 A simplified diagram of nodes and edges for most cited author and m...
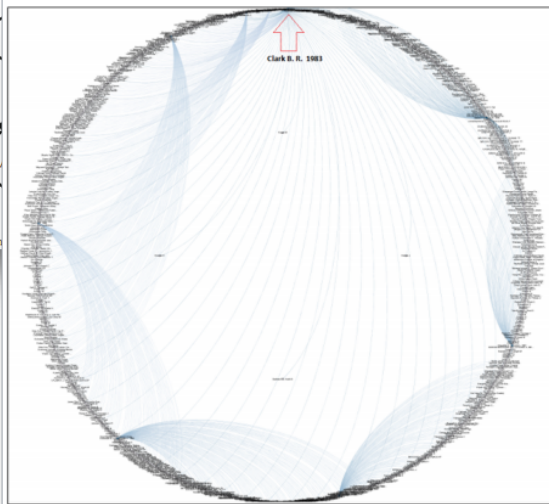
Fig. 6 Clark's 1983 article and its connections, circular layout

Legend: Entwistle ◯ ; Clark ⬭ ; Marton ⬭ ; Biggs ⬭ ; Ramsden ⬭ ; Becher ◯ ; Slaughter ◯ ; Prosser ⬭ ; Gibbons ◯ ; DiMaggio ◯
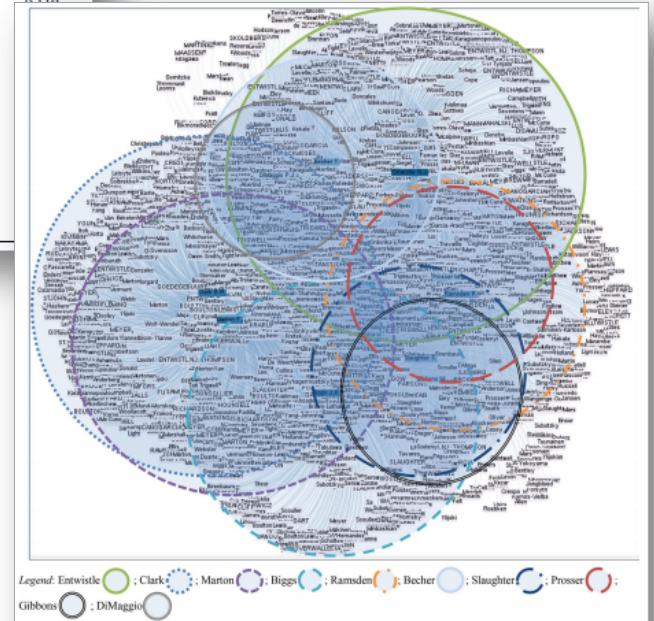
Fig. 11 Top 10 most cited authors, YifanHu layout

Selected findings

- **Comparative data now available**

Table 10 US, UK, Australia top authors from six various analyses

	US		UK	Australian		
	Budd (1990)	Budd and Magnuson (2010)	Tight (2008)	Kandlbinder (2012)	Calma and Davies (2015)	Calma and Davies (current)
1	Astin	Astin	Clark	Biggs	Entwistle	*Entwistle*
2	Pascarella	Pascarella	Ramsden	Marton	Marton	*Clark*
3	Centra	Tinto	Becher	Entwistle	Ramsden	*Marton*
4	Baldridge	Kuh	Biggs	Ramsden	Biggs	*Biggs*
5	Feldman	Cabrara	Boud	Becher	Becher	*Ramsden*

- **Meyer, Kember and Richardson making nearly 2% of all published articles in the journal.**

- **Authors from USA, Australia and England make up more than 50% of published articles.**

- **Nearly 15% of all published articles come from the top 10 institutions across UK, Australia, Netherlands, Africa and Hong Kong.**

- **Higher education research operate in two different geographic domains: USA and UK/Europe/Australia**

Example Application #3
Academy of Management Journal

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Academy of Management Journal, 1958–2014: a citation analysis

Angelito Calma[1] · Martin Davies[2]

Abstract This paper provides a citation network analysis of publications from the *Academy of Management Journal*, one of the key US-based journals in the field of Management. Our analysis covers all publications in the journal from 1958–2014. This represents the entire history of the journal until the arbitrary cut-off point of our study. The paper analyses the most published authors, most cited articles, most cited authors, top institutions, and the nationalities of authors that are most represented in the journal. 2304 articles containing 114,550 references were taken from the primary data source, the Web of Science™. An analysis of 114,550 citations was carried out using the Web of Science™ online analytics tool and Excel®. Gephi™, a data visualisation and manipulation software, was used to provide a visual representation of the citation networks. Results indicate that the most published authors within AMJ throughout the journal's history are Ivancevich, Golembiewski and Hambrick. The three most cited authors within AMJ are Pfeffer, Porter and Thompson. The single most cited article is Pfeffer and Salancik's 1978 article *The external control of organizations: a resource dependence perspective*. A keyword analysis revealed that the most important terms used in the journal's history were 'Performance', 'Organization' and 'Work'. Results from this paper extend our previous citation analyses of key journals in the discipline of Higher Education to a new discipline—the field of Management. The paper provides evidence of how visual analyses can help to represent the citation "geography" of a journal over time.

Keywords Citation analysis · Bibliometric analysis · Academy of Management Journal · Network analysis · Gephi™

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The original extracted data from Web of Science

Academy of Management Journal, 1958-2014: a citation analysis

- **1958-2014 data**
- **Web of Science database**
- **2,304 academic articles**
- **114,550 citations**
- **Using Excel and Gephi**
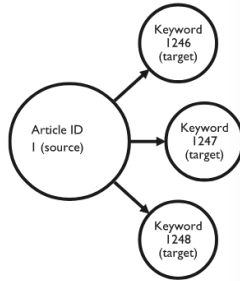
Walk-through

analysis in Gephi™ more manageable.

Fig. 1 Representation of source and target keywords

964   Scientometrics (2016) 108:959–975

In summary, there were 114,550 cited references from the 2304 articles. This equates to an article citing an average of 50 references. There were 1245 articles with a total of 10,602 associated keywords. Of those with keywords, the average number of keywords was 8.5.
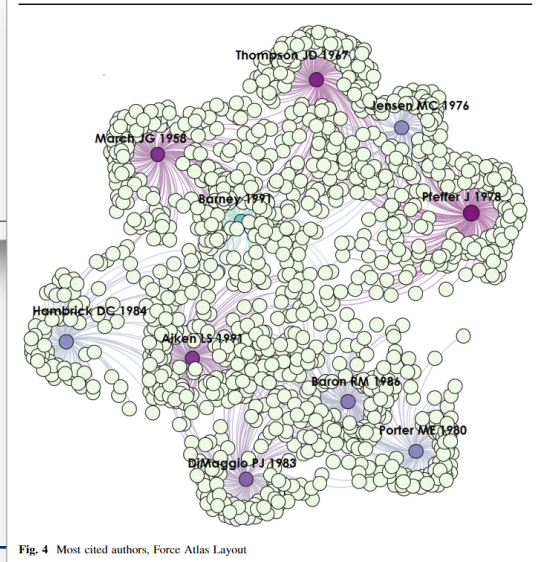
Scientometrics (2016) 108:959–975   971

Table 8 Most cited article or reference

Rank	Article or References	Number of citations	% of 114,550
1	Pfeffer, J., & Salancik, G. (1978). The external control of organizations: a resource dependence perspective	188	.16
2	Thompson, J.D. (1967). Organizations in action	174	.15
3	March, J.G., & Simon, H.A. (1958). Organizations	167	.15
4	Aiken, L.S., & West, S.G. (1991). Multiple regression: testing and interpreting interactions	157	.14
5	DiMaggio, P.J., & Powell, W. (1983). The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*, 147–60	128	.11
6	Baron, R.M., & Kenny, D.A. (1986). The moderator mediator variable distinction in social psychological-research-conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182	110	
7	Porter, M.E. (1980). Competitive strategy: techniques for analyzing industries and competitors	104	
8	Jensen, M.C. (1976). Theory of the firm: managerial behavior agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360	101	
9	Hambrick, D.C., & Mason, P.A. (1984). Upper echelons: the organization as a reflection of its top managers. *Academy of Management Review, 9*(2), 193–206.	99	
10	Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*, 99–120	98	

Ⓐ Springer

972   Scientometrics (2016) 108:959–975
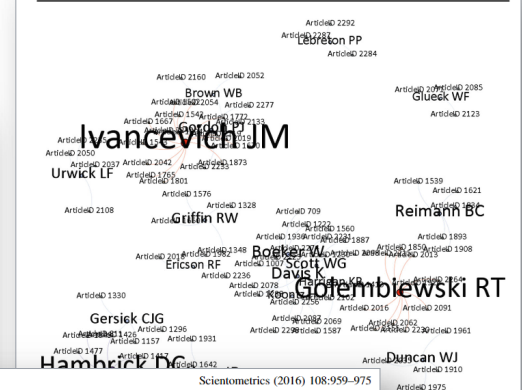
974   Scientometrics (2016) 108:959–975

Fig. 4 Most cited authors, Force Atlas Layout

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Selected findings

- USA, Canada and UK contributed 93% of all AMJ publications

- More than 10% of publications come from the top 3 universities: Pennsylvania State University, University of Maryland and Texas A&M University

- Most discussed topics relate to keywords 'performance', 'organization' and 'work'

- Most cited articles and authors were also found

Example Application #4
Journal of International Business Studies

EDITORIAL

Footnotes on *JIBS* 1970–2016

Alain Verbeke[1,2,3] and
Angelito Calma[4]

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INTRODUCTION

These footnotes on the *Journal of International Business Studies* (*JIBS*) 1970–2016 are intended to introduce the journal to scholars outside the international business (IB) discipline. The footnotes include a brief citation and keywords analysis. The citation analysis in the first part highlights the key players and key references in the IB field, and it celebrates the rich history of *JIBS* itself. The second part discusses the main subject matter addressed in refereed *JIBS* articles, through an analysis of keywords. These footnotes are timely as the journal nears 50 years of publication excellence, and an increasing interest in IB phenomena can be witnessed in a variety of management disciplines. We describe the intellectual shoulders upon which authors of future publications in *JIBS,* as well as designers of new IB curricula can stand.

Citation Analysis in International Business

Many prior IB citation analyses have been useful in tracking the impact of an author or journal, or to examine particular themes and their intellectual trajectory over time. One example is Griffith, Cavusgil, and Xu (2008) investigating the IB research agenda and the future direction of IB research based upon emerging themes. Another is Ferreira, Pinto, Serra, and Santos (2013) tracking the impact of a single, distinguished scholar, namely the late John Dunning, and his contribution to IB research. Ferreira, Ribeiro, Serra, and Armagan (2015) subsequently tracked the impact of the most cited and award-winning IB articles, and the related co-citation networks.

Yeheskel and Shenkar (2009) provided a citation analysis on *JIBS* itself. They presented information on the knowledge flows into and from IB, using cross-citations between *JIBS* and other leading

The original extracted data from Scopus

Footnotes on *JIBS* 1970-2016

- 1970-2016 data
- Web of Science and Scopus databases
- 1,474 academic articles
- 80,368 references
- Excel and Wordle

Walk-through

METHODS

The second author of this commentary accessed the Web of Science (WoS) and engaged in a search involving the entire publication history of *JIBS* from 1970 through to June 2016. This revealed 2,066 pieces indexed, of which 1,474 were academic articles, 317 book reviews, 97 editorial materials, 89 other reviews, and 47 notes. Only the 1,474 academic articles were used in this Commentary.[2]

Almost all articles, namely 1,465, contained references. There were a total of 80,368 references. This equates to an average of 55 references per article. A small number of these references, namely 982, were not usable for further analysis.[3]

Usage of WoS analytics revealed the top authors, top countries, and top organizations publishing in *JIBS*. We identified the most discussed topics through the use of keywords, as well as the most highly published authors within *JIBS*. As of 2003, *JIBS* required authors to state keywords at the front of their article. We found 666 articles that contained 6,692 keywords and 3,300 authors across the 1,474 articles (for the 2003–2016 period). Another set of keywords, but assigned by WoS and covering the longer, 1990–2016 period, was also used.[4] From this second set, we identified thematic clusters.[5]

RESULTS AND DISCUSSION

Top 25 Authors

A total of 3,300 authors authored the 1,474 articles. We were interested in identifying the most highly published authors in *JIBS*. Using WoS analytics, Table 1 shows that Peter Buckley and Mike Kotabe, two intellectual giants in the IB field, shared the top spot with 18 published articles. The top 5 is rounded out by Chuck Kwok, Oded Shenkar, Paul Beamish, and Yadong Luo. The top 25 authors have contributed a combined 271 (18.39%) publications to *JIBS*.

Top 25 Publishing Countries

Table 2 lists the United States, Canada, the United Kingdom, and China as the top four *JIBS* contrib-

Table 1 Top 25 most published authors

Rank	Author	No. of articles published in *JIBS*	% of 1,474
1	Buckley P.J.	18	1.221
	Kotabe M.	18	1.221
3	Shenkar O.	17	1.153
4	Kwok C.C.Y.	16	1.085
5	Beamish P.W.	14	0.950
	Luo Y.D.	14	0.950
7	Pan Y.G.	12	0.814
8	Aulakh P.S.	11	0.746
	Verbeke A.	11	0.746
10	Cavusgil S.T.	10	0.678
	Hennart J.F.	10	0.678
	Rugman A.M.	10	0.678
	Tse D.K.	10	0.678
14	Dunning J.H.	9	0.611
	Makino S.	9	0.611
	Ricks D.A.	9	0.611
	Toyne B.	9	0.611
18	Contractor F.	8	0.543
	Filatotchev I.	8	0.543
	Griffith D.A.	8	0.543
	Meyer K.E.	8	0.543
	Pedersen T.	8	0.543
	Peng M.W.	8	0.543
	Ralston D.A.	8	0.543
	Roth K.	8	0.543

Top 25 Publishing Universities

Which universities publish the most in *JIBS*? More than 3,000 records associated with contributing universities and organizations could be linked to the 1,474 articles. The University of South Carolina contributed more than any other university, with a total of 54 records (Table 3). Most of these universities have a long history in supporting IB research, beyond the publication successes of individual scholars. A key challenge for institutions interested in becoming centres of excellence in IB research, is to understand which historical antecedents and positive forces created intellectual powerhouses in IB such as the ones highlighted in Table 3. Three key ingredients for success appear to be the following: (1) a 'hot group' of a few dedicated scholars with a genuine interest not only in IB research, but also in teaching and service to the field; (2) a supportive and broad-minded Dean or Head of School who appreciates the stakeholder and soci-

Figure 1 Most discussed topics using keywords set 1.

Figure 2 Most used keywords (separated into *single words*) tag cloud.

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Selected findings

- USA, Canada and UK contributed 80% of all JIBS publications

- More than 8% of publications come from the top 3 universities: University of South Carolina, Chinese University of Hong Kong and University of Texas

- The most cited scholarly work is *Culture's Consequences*, published in 1980 by the Dutch social psychologist Geert Hofstede.

- The major 'anchor' keywords were 'firm', 'performance', 'MNCs/MNEs' and management

- We found the top 25 publishing authors, universities and countries

Developments in this area

- **Data mining technology**
- **Leximancer (link)**
- **Centre for Complex Network Research (link)**
- **SciencePaths by Kim Albrecht (link)**
- **Barabási Lab (link)**
- **Northeastern University Network Science Institute (link)**

  …and many other developments in tools and techniques used in retrieval, collection, data manipulation and analysis.

Activity

- **Let's use a journal of interest and extract data!**

Thank You

Questions?

Contact

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