

Collaboration in the events literature: a co-authorship network study

Rodolfo Baggio

Master in Economics and Tourism, Bocconi University, Milan, Italy
e-mail: rodolfo.baggio@unibocconi.it

Noel Scott

Charles Arcodia

School of Tourism, The University of Queensland, Australia
e-mail: noel.scott@uq.edu.au
charles.arcodia@uq.edu.au

Abstract

This paper examines characteristics of the co-authorship network derived from an examination of the events literature found in major academic journals and databases. This network exhibits a low density with few clusters of interlinked authors. These clusters are primarily based around particular universities and examination of their location suggests the importance of geography in forming co-authorship linkages. A number of other properties of the events literature are noted.

Introduction

A growing interest in knowledge management and in how collaborative networks of practice affect the diffusion and the acquisition of knowledge have greatly benefited from the techniques that provide visual representation and mathematical analysis of collaboration networks formed by researchers and practitioners interested in a certain domain (Cowan & Jonard, 2004). These knowledge domains, or special fields of study, form an 'invisible college' and help create a common understanding of the field, thus contributing to the advancement of a discipline, both from a theoretical and a "practical" point of view.

We may consider such a domain is a dynamically evolving structure in which the process of interaction and collaboration among the participants plays a crucial role. The dynamics of collaboration have been found to be important in the creation of networks through micro-level career dynamics of scientists in high-technology clusters (Casper & Murray, 2005). Further, consideration of networks as dynamic structures allows the trade-off between cohesive dense networks that are useful for “exploitation” of existing ideas through shared mental representations and established contacts facilitating efficient interaction and more diffuse boundary spanning networks useful for “exploration” and introduction of new ideas (March, 1991). Thus consideration of the dynamics of networks allows potential insight into the changing potential of networks of networks as paths for exchange of different types of knowledge.

Many studies have been conducted to analyse patterns and dynamics of collaboration networks in the scientific research arena, (Cardillo, Scellato, & Latora, 2006; Owen-Smith & Powell, 2004; Powell, White, Koput, & Owen-Smith, 2005; Wagner & Leydesdorff, 2005) and social sciences. The structural characteristics of such networks have been described and similarities and differences found in specific cases have been highlighted. Network analysis methods, applied to the scientific collaborations represented by co-authorship of scholarly papers have proved to be effective diagnostic methods for studying the patterns of relationships that connect members in different groups, the exchange of knowledge resources within the network, the number and type of the subgroups and their evolution (Hu & Racherla, 2008; Kretschmer, 2004). Co-citation analysis shows that literatures cohere and change in intelligible ways over time (Howard & Belver, 1981) and can be used to visualize a field through a representative slice of its literature (White & McCain, 1998).

Network analysis methods been used in a wide variety of fields to develop models and help understand the structural characteristics of complex systems, their dynamic behaviour and many processes unfolding within them (Boccaletti, Latora, Moreno, Chavez, & Hwang, 2006; Caldarelli, 2007). In part this increased use is due to improvements in the development of computer software and more powerful computers in the past decades. In the social sciences computer algorithms have proved crucial for the study of the network of relationships between individuals and/or organizations and to highlight the implications of the structural patterns they exhibit (Freeman, 2004). This interest has led to studies of co-

authorships for science policy purposes and numerous papers concerning the advantages and limitations of such an approach have been published (Frame & Carpenter, 1979; Katz & Martin, 1997; Meun & Persson, 1996).

The aim of this paper is to examine the collaboration network of researchers involved in the study of events through patterns of co-authorship found in the literature and therefore to examine the extent and pattern of collaboration. The analysis indicated four unconnected clusters of authors. For these clusters, the possible effect of geographic proximity on cluster formation is explored. Thus the paper explores the question of what makes academic publication clusters cohesive within the events area.

Reasons for academic collaboration

The study of collaborative publications in scientific circles from an historical (deB Beaver & Rosen, 1978, 1979a, 1979b) and sociological perspective (Frame & Carpenter, 1979) has highlighted the increasing importance of collaboration and co-authorship. Collaboration and co-authorship have been found to be related to the professionalization of science and lead to higher productivity and visibility within the academic community for the individuals concerned. In an historical study of the French scientific community between 1799-1830 deB Beaver (1979b) for example found that collaboration was related to long term recognition, higher productivity and greater formal visibility compared to individual authors. Katz (1997) lists 10 reasons for research collaboration in the broader scientific community including changing patterns of funding, increasing specialization of science, a desire to obtain cross fertilization of ideas across disciplines, a need to obtain experience and to work in close physical proximity with others in order to benefit from their skills and tacit knowledge.

Geographical proximity appears to be an important factor underpinning collaboration as it is generally agreed that a variety of locational based social or intellectual forces stimulate collaboration although exactly their exact nature and mechanism of operation are the subject of debate. Some authors consider that co-authorship reflects the results of informal conversation leading through a 'courtship' process to a commitment to co-operate (Hagstrom, 1965; Katz & Martin, 1997) and that spatial proximity leads to informal communication. Proximity is also a factor with many papers co-authored by doctoral students and their supervisors. After completion, doctoral graduates form an 'invisible

college' that also provides opportunities for collaboration (Crane, 1972; De Solla Price & deB. Beaver, 1966; Gmur, 2003).

There is some prior interest in citation analysis in tourism and hospitality to identify overlap between the hospitality and tourism research communities.(Mattila, 2004) and in analysis of the trends and methods found in disciplinary areas such as convention research (Yoo & Weber, 2005). Increasingly citation analysis is also used as a means of ranking academic outcomes (Jamal, Smith, & Watson, 2008; Law & Chon, 2007). Author co-citation analysis has also been used in the hospitality literature to examine the network structure of the research community in the field of hospitality business research. This paper uses similar methods but in addition to the describing the network of co-citations it explores the effect of geographical proximity (as measured by University affiliation).

Data collection and analysis

Data have been collected from bibliographic databases referencing papers published in leading tourism and events journals. Bibliographic data for papers published in the period 1978-2007 have been retrieved from online sources such as the bibliographic databases (Scopus, JSTOR or CAB Abstracts) and the websites belonging to publishers of renowned scholarly journals dealing with tourism, hospitality or events. All searches have been performed by looking for 'event(s)' in the title of the paper. The dataset obtained has been scanned for cleaning and a number of papers removed. These papers use the term event or events related to topics such as crisis events or exogenous events. Authors identified with different initials or names have been amended and multiple instances removed. The final database comprises 305 papers and 487 authors; 41 different journals were recorded.

A co-authorship network was then constructed in which the nodes are researchers and a link between them is defined when they co-author a paper. Standard network analysis methods and software (Pajek) were used to describe the static and dynamic characteristics of this co-authorship network. Co-authorship clusters were further analysed to develop possible reasons for why particular links were formed. Results of these analyses are presented below.

Results

An analysis of the co-authorship database was first conducted based on the number of publications produced each year. The earliest event related reference identified in this study was a brief review in *Annals of Tourism Research* (Anonymous, 1978) of a paper presented to the 1977 TTRA Conference. The paper was entitled “*Recurrent Tourism-Oriented Special Events: The Case of College Bowl Games*” and written by Rodney Stiefbold and William Swart from the Department of Management Science at the University of Miami. The next earliest discussed community events as one method that Canadian provincial governments use to stimulate tourism (Papson, 1981). From 1996 and especially since 2005 events related papers have experienced significant growth in numbers. This is considered related to the development of the events area as a distinct field of study. The time distribution of papers is shown in Figure 1.

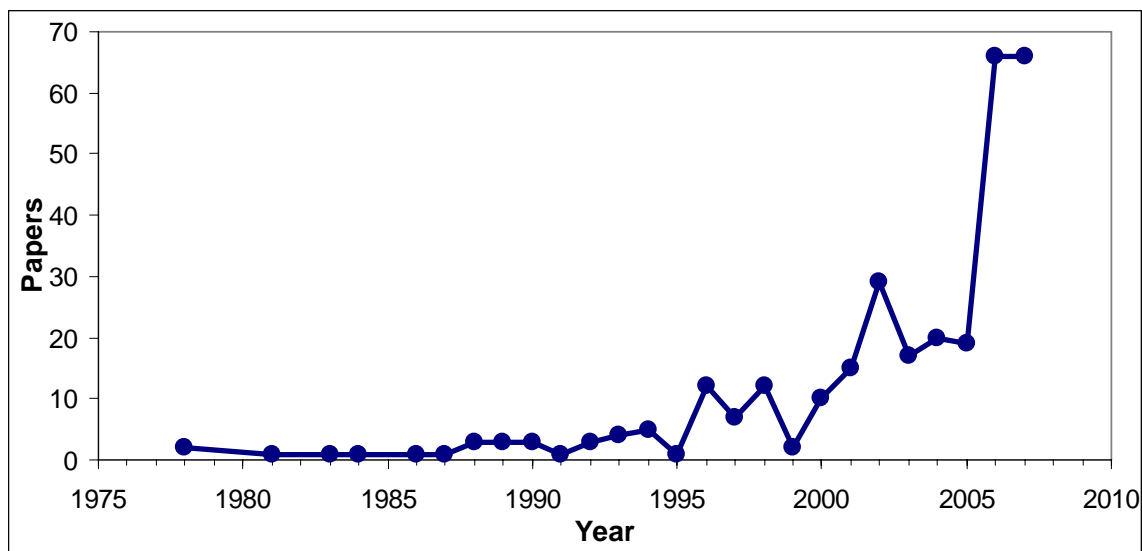


Figure 1 Time distribution of the papers

A second analysis examined the journals in which the papers selected were published. It was found that 13 journals contain 80% of the papers. The most frequently used journals in order were *Tourism Management*, *Annals of Tourism Research*, *Events Management*, *Journal of Travel Research* and *Tourism Economics*. Two specialist events journals, *Event Management* and *Journal of Convention and Event Tourism* were established in 1995 and 1999 respectively and may have been expected to have been more frequently found in the database. The reason these journals were not found more frequently may be due to only recent citations being included in the citation databases searched. Figure 2 shows the

distribution of articles selected by journal and Table 1 shows the names of frequently used journals.

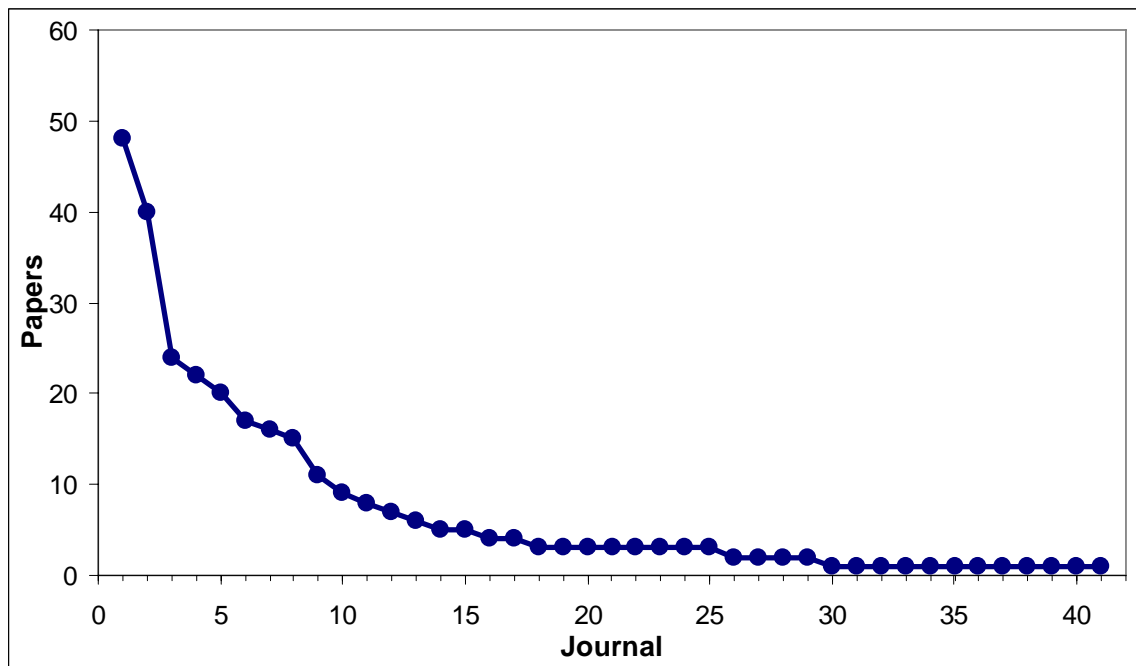


Figure 2: Distribution of papers across the journals

Table 1: Event Journals by number of articles

Journal	Papers
Tourism Management	48
Annals of Tourism Research	40
Event Management	24
Journal of Travel Research	22
Tourism Economics	20
Journal of Sport & Tourism	17
Current Issues in Tourism	16
Journal of Convention and Event Tourism	15
Tourism	11
Cornell Hotel and Restaurant Administration Quarterly	9
Tourism Geographies	8
Journal of Sustainable Tourism	7
Tourism Review International	6
Asia Pacific Journal of Tourism Research	5

A third analysis examined the number of authors per paper. On average a paper has 1.86 authors and an author has published 1.16 papers. Around 44% of the papers have been

written by a single author and 89% of the authors have published only one paper. These distributions are shown in Figures 3 and 4.

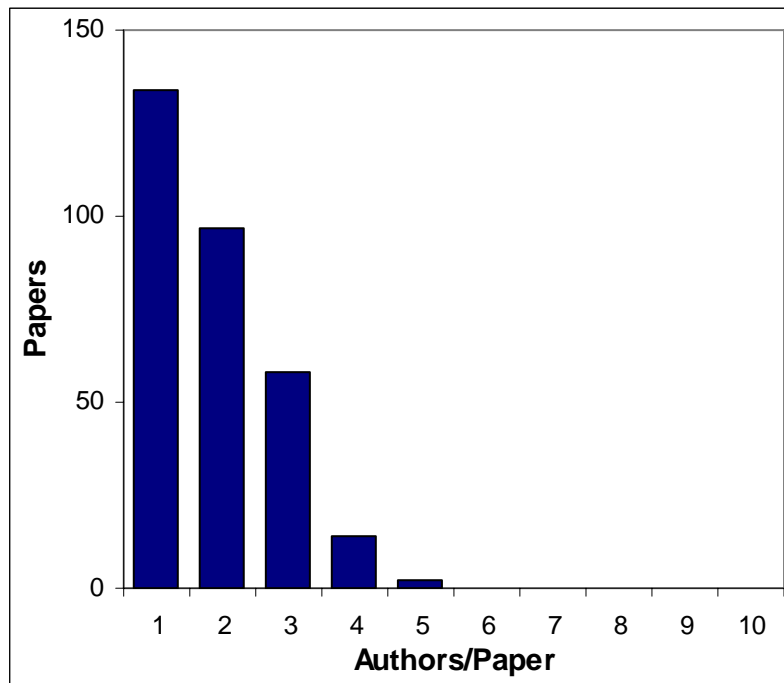


Figure 3: Distribution of numbers of authors per paper

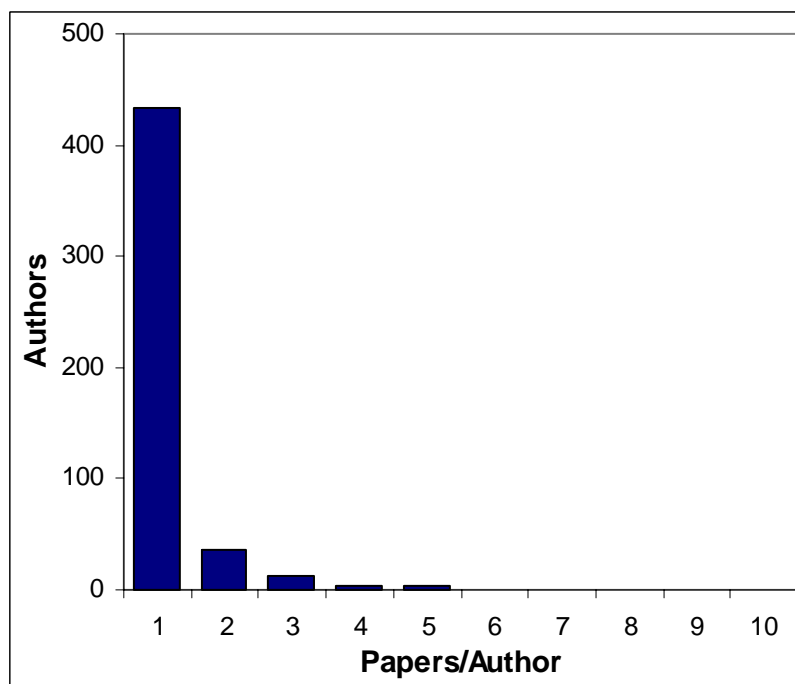


Figure 4: Distribution of paper per author

Interestingly, there has been a slight increase in collaboration from 1977 onwards. Figure 5 shows the average number of authors per year. If the first point (based on a single paper with two authors) is not included, correlation is good: $R^2 = 0.72$.

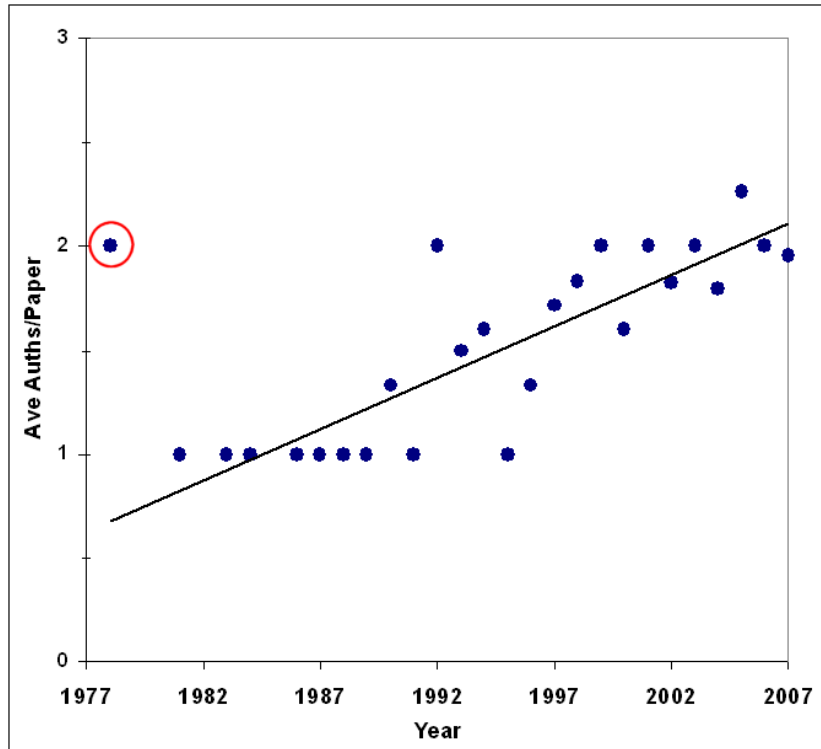


Figure 5: Average number of authors per paper

Based on the selected papers, the authors most frequently cited in this study are Donald Getz, Trevor Mules, Muzaffer Uysal, Charles Arcodia, Choong-Ki Lee, and Douglas Pearce as shown in Table 2.

Table 2: Most prolific authors

Auth	No.Papers
Getz D	5
Mules T	5
Uysal M	5
Arcodia C	4
Lee C K	4
Pearce D G	4
Carmichael B	3
Daniels M J	3
Dwyer L	3
Forsyth P	3

A fourth analysis was derived from a co-authorship network which was built by taking authors as nodes and a link made between two authors if they have co-authored a paper. The network is undirected and unweighted and is shown in Figure 6.

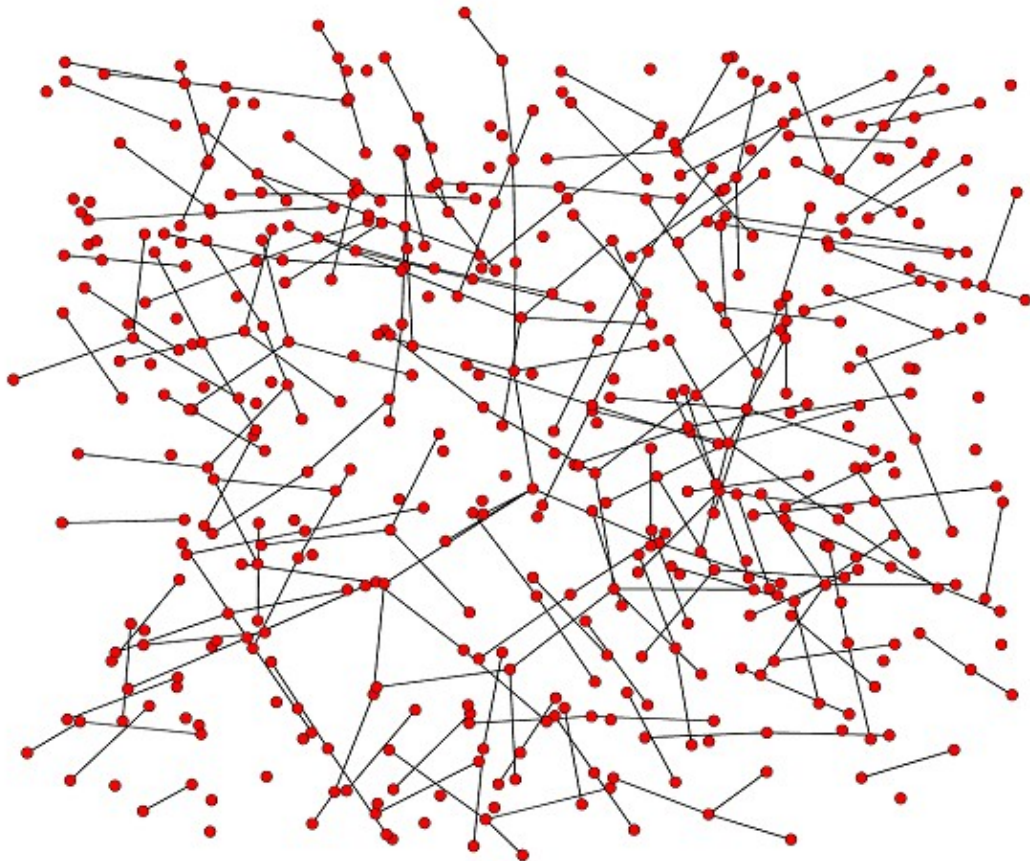


Figure 6: The network of authors

Table 3: Basic network metrics

	Network	Random equivalent
No. of nodes	487	487
No. of links	251	251
Density	0.0021	0.0021
Disconnected nodes	0.2115	0.3614
Diameter	9	22.7
Average path length	2.0716	7.5022
Clustering coefficient	0.0044	0.0004
Average degree	1.0308	1.0308
Average closeness	0.0042	0.0060
Average betweenness	0.00001	0.0006

A number of network statistics were calculated and the measurements given in Table 3 compared to a random network with the same number of nodes and links (the random equivalent is the average over 10 realisations). Readers interested in deepening this topic (network analysis methods) may look at Scott et al. (2008).

The network is very fragmented. Ignoring the nodes with degree = 0 (135 papers with a single author), 134 groups (collaborations) can be found. Most collaborations are between a very small number of authors (56.5% have two authors) and there were little clustering (see Figure 7).

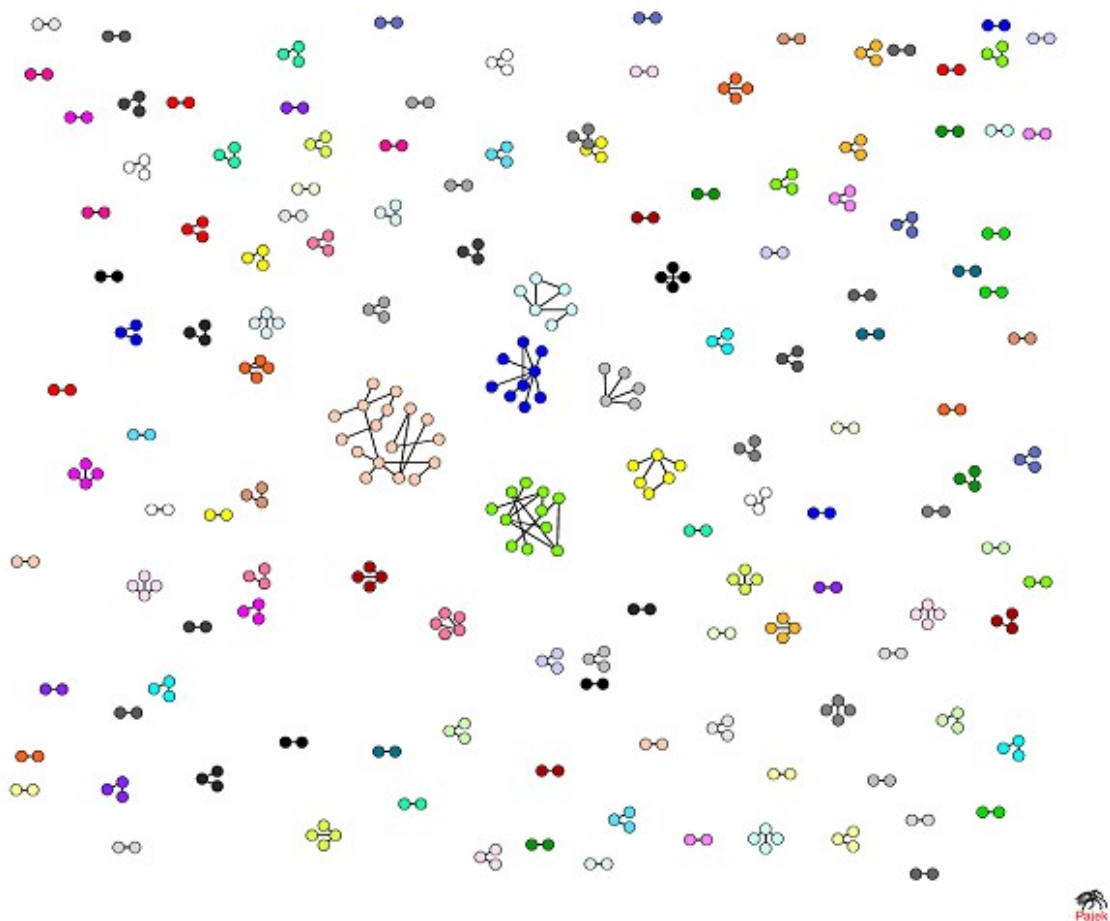


Figure 7: The groups (connected components) identified in the authors network

A fifth analysis was undertaken to explore the four largest clusters of authors and seek reasons why these clusters may have formed and each is discussed below. These networks and their authors are shown below.

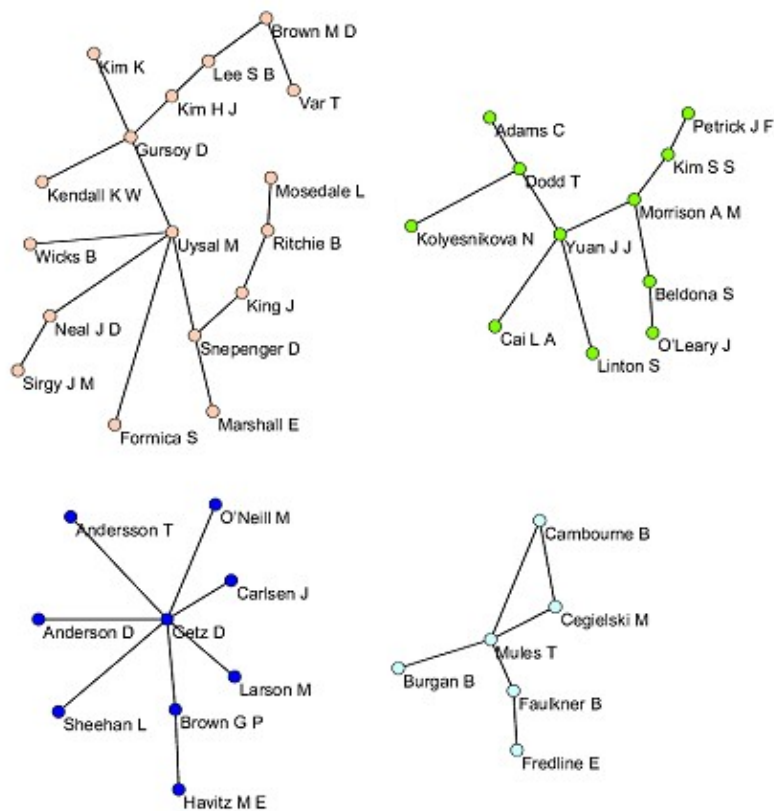


Figure 8: The four largest clusters

CLUSTER 1, the largest cluster ‘begins’ with a conference report by Uysal and Wicks and appear to involve a theme concerning motivation applied to events. Uysal and Gursoy are important linking authors. In this cluster all authors except one are at US Universities (Virginia Polytechnic, Washington State) which suggests the importance of proximity in determining co-authorship.

Uysal and Wicks (1993)	Conference report	Virginia Polytechnic University of Illinois at Urbana-Champaign, USA
Formica and Uysal (1998)	Segmentation	Virginia Polytechnic/
M. Brown, Var, and Lee,(2002)	Economic impact	Texas A&M University
Gursoy, Kim, and Uysal (2004)	Perceived impacts	Washington State University Virginia Polytechnic Southern Illinois University

Gursoy and Kendall (2006)	Resident perceptions	Washington State
H. Kim, Gursoy, and Lee (2006)	Motivation World Cup	Washington State Kyung Hee University
Snepenger, King, Marshall, and Uysal (2006)	Motivation	Montana State University Virginia Polytechnic Institute

CLUSTER 2 is based at Texas Tech and Sejong Universities and demonstrates some cross sectoral collaboration (wine and events) as well as some evidence of international co-authorship.

Beldona, Morrison, and O’Leary (2005)	Motivations for Purchasing Tourism/Event Products Online	East Carolina University Purdue University Texas A&M University
Dodd, Yuan, Adams, and Kolyesnikova(2006)	Motivations – Wine Festival Attendees	Texas Tech University
S. S. Kim and Morrision (2005)	Tourist Perceptions of Images of South Korea After FIFA 2002 World Cup Event	Sejong Universities Purdue University
S. Kim and Petrick (2005)	Perceptions of Impacts of FIFA 2002 World Cup Event	Sejong Universities Texas A&M University
Yuan, Cai, Morrison, and Linton (2005)	Motivations – Wine Festival Attendees	Texas Tech University

CLUSTER 3 comprises a small group initially based at the University of Calgary but with some evidence of papers written based on some authors providing access and help in data collection. It contains a rare example of cross continent co-authorship. This cluster is based around Getz. Cluster 5 focuses on the theory of events, as opposed to case examples.

G. P. Brown, Havitz, and Getz (2006)	Events/Wine	University of South Australia University of Waterloo - Canada University of Calgary
Getz, Anderson, and Sheehan (1998)	Role of Convention & Visitors Bureaux	University of Calgary
Getz, Andersson, and Larson (2007)	Role of Stakeholders – Festivals/Special Events	University of Calgary

Getz, O'Neill, and Carlsen (2001)	Service Mapping – to Evaluate/Improve Service Quality at Special Events	University of Calgary University of Western Australia
-----------------------------------	---	--

CLUSTER 4 is based in Australia and centres on Mules. It is economic in nature with a focus on impacts possibly derived from policy. The main cause of the cluster seems to be a university effect with Mules moving around to different universities.

Burgan and Mules (1992)	Sporting Events – Economic Impacts	University of Adelaide
Burgan and Mules (2001)	Event Tourism – Economic Impacts	University of Adelaide University of Canberra
Cambourne, Cegielski, and Mules (2002)	Event Ticket Pricing	University of Canberra
Cegielski and Mules (2002)	Resident Perceptions of Events	University of Canberra
Fredline and Faulkner (2000)	Community Reactions to the Impact of Events	Griffith University

Discussion

The events literature is relatively young and is developing strongly and there is some evidence to suggest that collaboration is increasing as indicated by co-authorship of academic papers. However, the literature is still quite fragmented with little network development amongst authors. The networks that are in existence appear to be based around a particular academic including Uysal (Cluster 1), Getz (Cluster 3), and Mules (Cluster 4). Others are based around universities such as Cluster 2 based between Texas Tech and Sejong Universities. Thus it appears that the main reason for co-authorship networks is not geographical proximity but instead the presence of a leading figure who can bring different authors together over time. Another factor that may be important in collaboration is access to resources or to expertise. In some cases though, other reasons for co-authorship may be more pragmatic and involve access to data. This is found in papers where an established author may co-author with someone from another country in order to study a particular event (America's Cup, Seoul Olympics).

This research appears useful for a number of reasons. It may be useful for new researchers trying to understand the structure of academic events authorship and the 'invisible'

colleges of events researchers. However it may also be useful for senior academics to consider this network structure as one that can be improved through more linking and exchange of ideas and papers between distinct networks.

A limitation of this research is that the scope of data collection, using as it did bibliographic databases (Scopus, JSTOR or CAB Abstracts) and first tier journals, excluded a number of specialist events journals such as for example the International Journal of Event Management Research. Future research including a more extensive list of specialist journals is recommended to identify the extent of those clusters found in this research and to find others. It would also be of interest for further research to examine in more detail the reasons for co-authorship and the factors that may be useful in stimulating co-authorship. Further studies would also be able to be produced in other academic disciplinary areas such as tourism using the same methods.

References

- Anonymous. (1978). (TSM) A proposed interdisciplinary methodology for economic impact studies of recurrent tourism-oriented special events: The case of college bowl games : Rodney P. Stiefbold and William W. Swart, Department of Management Science (University of Miami, Coral Gables, Florida 33124, USA), 1977, 16 pp. *Annals of Tourism Research*, 5(1), 189-190.
- Beldona, S., Morrison, A., & O'Leary, J. (2005). Online shopping motivations and pleasure travel products: a correspondence analysis. *Tourism Management*, 26, 561–570.
- Boccaletti, S., Latora, V., Moreno, Y., Chavez, M., & Hwang, D.-U. (2006). Complex networks: Structure and dynamics. *Physics Reports*, 424(4-5), 175-308.
- Brown, G. P., Havitz, M. E., & Getz, D. (2006). Relationship Between Wine Involvement and Wine-Related Travel. *Journal of Travel & Tourism Marketing*, 21(1), 31-46.
- Brown, M. D., Var, T., & Lee, S. (2002). Messina Hof Wine and Jass Festival: An economic impact analysis. *Tourism Economics*, 8(3), 273-279.
- Burgan, B., & Mules, T. (1992). Economic impact of sporting events. *Annals of Tourism Research*, 19(4), 700-710.
- Burgan, B., & Mules, T. (2001). Reconciling cost-benefit and economic impact assessment for event tourism. *Tourism Economics*, 7(4), 321-330.
- Caldarelli, G. (2007). *Scale-Free networks: complex webs in nature and technology*. Oxford: Oxford University Press.
- Cambourne, B., Cegielski, M., & Mules, T. (2002). Use of dichotomous choice modelling to fix event ticket prices. *Journal of Sport & Tourism*, 7(3), 44-45.
- Cardillo, A., Scellato, S., & Latora, V. (2006). A topological analysis of scientific coauthorship networks. *Physica A: Statistical Mechanics and its Applications*, 372(2), 333-339.
- Casper, S., & Murray, F. (2005). Careers and clusters: analyzing the career network dynamic of biotechnology clusters. *Journal of Engineering and Technology Management*, 22(1-2), 51-74.
- Cegielski, M., & Mules, T. (2002). Aspects of Residents' Perceptions of the GMC 400–Canberra's V8 Supercar Race. *Current Issues in Tourism*, 5(1), 54–70.
- Cowan, R., & Jonard, N. (2004). Network structure and the diffusion of knowledge. *Journal of Economic Dynamics and Control*, 28(8), 1557-1575.

- Crane, D. (1972). *Invisible Colleges: Diffusion of Knowledge in Scientific Communication*. Chicago.: University of Chicago Press.
- De Solla Price, D., & deB. Beaver, D. (1966). Collaboration in an invisible college. *American Psychologist*, 21(11), 1011-1018.
- deB Beaver, D., & Rosen, R. (1978). Studies in scientific collaboration Part I: The professional origins of scientific co-authorship. *Scientometrics*, 1(1), 65-84.
- deB Beaver, D., & Rosen, R. (1979a). Studies in scientific collaboration part III. Professionalization and the natural history of modern scientific co-authorship. *Scientometrics*, 1(3), 133-149.
- deB Beaver, D., & Rosen, R. (1979b). Studies in scientific collaboration part II. Scientific co-authorship, research productivity and visibility in the French scientific elite, 1799-1830. *Scientometrics*, 1(2), 133-149.
- Dodd, T., Yuan, J., Adams, C., & Kolyesnikova, N. (2006). Motivations of Young People for Visiting Wine Festivals. *Event Management*, 10, 23-33.
- Formica, S., & Uysal, M. (1998). Market Segmentation of an International Cultural-Historical Event in Italy. *Journal of Travel Research*, 36(4), 16-24.
- Frame, J. D., & Carpenter, M. P. (1979). International Research Collaboration. *Social Studies of Science*, 9(4), 481-497.
- Fredline, E., & Faulkner, B. (2000). Host community reactions - A cluster analysis. *Annals of Tourism Research*, 27(3), 763-784.
- Freeman, L. C. (2004). *The development of social network analysis : a study in the sociology of science*. Vancouver: Empirical Press.
- Getz, D., Anderson, D., & Sheehan, L. (1998). Role, issues, and strategies for convention and visitors' bureaux in destination planning and product development: a survey of Canadian bureaux. *Tourism Management*, 19(4), 331-340.
- Getz, D., Andersson, T., & Larson, M. (2007). Festival Stakeholder Roles: Concepts and Case Studies. *Event Management*, 10(2/3), 103-122.
- Getz, D., O'Neill, M., & Carlsen, J. (2001). Service Quality Evaluation at Events through Service Mapping. *Journal of Travel Research*, 39(4), 380-390.
- Gmur, M. (2003). Co-citation analysis and the search for invisible colleges: A methodological evaluation. *Scientometrics*, 57(1), 27-57.
- Gursoy, D., & Kendall, K. W. (2006). Hosting mega events: Modeling Locals' Support. *Annals of Tourism Research*, 33(3), 603-623.
- Gursoy, D., Kim, K., & Uysal, M. (2004). Perceived impacts of festivals and special events by organizers: an extension and validation. *Tourism Management*, 25(2), 171-181.
- Hagstrom, W. O. (1965). *The Scientific Community*. New York,: Basic Books.
- Howard, D. W., & Belver, C. G. (1981). Author Cocitation: A Literature Measure of Intellectual Structure. *Journal of the American Society for Information Science (pre-1986)*, 32(3), 163-172.
- Hu, C., & Racherla, P. (2008). Visual representation of knowledge networks: A social network analysis of hospitality research domain. *International Journal of Hospitality Management*, 27(2), 302-312.
- Jamal, T., Smith, B., & Watson, E. (2008). Ranking, rating and scoring of tourism journals: Interdisciplinary challenges and innovations. *Tourism Management*, 29(1), 66-78.
- Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, 26(1), 1-18.
- Kim, H. J., Gursoy, D., & Lee, S.-B. (2006). The impact of the 2002 World Cup on South Korea: comparisons of pre- and post-games. *Tourism Management*, 27(1), 86-96.
- Kim, S. S., & Morrision, A. M. (2005). Change of images of South Korea among foreign tourists after the 2002 FIFA World Cup. *Tourism Management*, 26(2), 233-247.
- Kim, S. S., & Petrick, J. F. (2005). Residents' perceptions on impacts of the FIFA 2002 World Cup: the case of Seoul as a host city. *Tourism Management*, 26(1), 25-38.
- Kretschmer, H. (2004). Author productivity and geodesic distance in bibliographic co-authorship networks, and visibility on the Web. *Scientometrics*, 60(3), 409-420.

- Law, R., & Chon, K. (2007). Evaluating research performance in tourism and hospitality: The perspective of university program heads. *Tourism Management*, 28(5), 1203-1211.
- March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71-87.
- Mattila, A. (2004). Consumer behavior research in hospitality and tourism journals. *International Journal of Hospitality Management*, 23(5), 449-457.
- Meun, G., & Persson, O. (1996). Studying Research Collaboration Using Co-authorships. *Scientometrics*, 36(3), 363-377.
- Owen-Smith, J., & Powell, W. W. (2004). Knowledge networks as channels and conduits: the effects of spillovers in the Boston biotechnology community. *Organization Science*, 15(1), 5-21.
- Papson, S. (1981). Spuriousness and tourism : Politics of Two Canadian Provincial Government. *Annals of Tourism Research*, 8(2), 220-235.
- Powell, W. W., White, D. R., Koput, K. W., & Owen-Smith, J. (2005). Network Dynamics and Field Evolution: The Growth of Interorganizational Collaboration in the Life Sciences. *American Journal of Sociology*, 110(4), 1132-1205.
- Scott, N., Baggio, R., & Cooper, C. (2008). *Network Analysis and Tourism: From Theory to Practice*. Clevedon, UK: Channel View.
- Snepenger, D., King, J., Marshall, E., & Uysal, M. (2006). Modeling Iso-Ahola's Motivation Theory in the Tourism Context. *Journal of Travel Research*, 45(2), 140-149.
- Uysal, M., & Wicks, B. (1993). Festivals and events. *Annals of Tourism Research*, 20(4), 777-778.
- Wagner, C. S., & Leydesdorff, L. (2005). Network structure, self-organization, and the growth of international collaboration in science. *Research Policy*, 34, 1608-1618.
- White, H., & McCain, K. (1998). Visualizing a discipline: An author co-citation analysis of information science, 1972-1995. *Journal of the American Society for Information Science*, 49(4), 327-355.
- Yoo, J. J.-E., & Weber, K. (2005). Progress in convention tourism research. *Journal of Hospitality and Tourism Research*, 29(2), 194-222.
- Yuan, J., Cai, L. A., Morrison, A. M., & Linton, S. (2005). An analysis of wine festival attendees' motivations: A synergy of wine, travel and special events? *Journal of Vacation Marketing*, 11(1), 41-58.