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ARTICLE

Growth and structure of authorship and co-authorship network in the strategic management realm: Evidence from the Strategic Management Journal

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Abstract The main objective of this study is to investigate the intellectual structure and evolution of author collaborations from articles published in the *Strategic Management Journal* between 1980 and 2014. This assessment includes the general view of authorship, authorship patterns, author productivity, ranking of authors, visualization of the co-authorship network, comparison of strategic management co-authorship network attributes with those of other disciplines, the evolution of main components and core authors in the networks by period, discussions on whether the strategic management network fits with the small world network theory, individual network attributes such as degree centrality, Bonacich's power index, closeness centrality, and betweenness centrality. Finally, the authors provide an inclusive evaluation of the results, limitations, and suggestions for future research.

Introduction

The main purpose of this study is to explore and visualize the evolution of collaboration among researchers in the academic discipline of strategic management (SM). The authors vet the dynamics of SM authorship networks from articles published in *Strategic Management Journal* (SMJ) via bibliometrics analysis – a co-authorship analysis.

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Collaboration has increased among researchers in studies, herein scientific research, (Cronin et al., 2003, 2004); hence, collaboration is sought by researchers to explain its meaning, boundary, costs, benefits, and measurement attributes (Katz and Martin, 1997; Laudel, 2002; Sonnenwald, 2007). On the other hand, this collaboration in various disciplines established research communities that constitute social networks. Since social networks positively help researchers to create or share knowledge (Borgman and Furner, 2002; Lin, 2001), they are used to identify the knowledge domain of disciplines. To explore the collaboration roots of disciplines, social network analysis is examined

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by using co-occurrence analysis referred to as bibliometrics analysis, including author co-citation, co-authorship (employed herein), and co-word analysis (Leydesdorff and Vaughan, 2006; Otte and Rousseau, 2002; Owen-Smith et al., 2002). In recent years, a number of studies have been conducted to reveal the evolution of collaboration and networks and to identify key actors as either individuals or groups and to demonstrate the relationships among these actors, or relationships between indicators of these networks and actors' outputs (see Fatt et al., 2010; Lu et al., 2010; Perianes-Rodríhuez et al., 2010; Said et al., 2008). Therefore, the interest in management and organization literature (Ferreira et al., 2014; Zupic and Čater, 2015) has increased.

The evolution based on epistemology and the knowledge domain or collaboration roots of SM as a young academic discipline has been assessed in a number of studies via qualitative (review, or content analysis) and quantitative (bibliometric) methods. Qualitative research methods have examined the evolution of SM focus on macro and micro foundations of the field (Guerras-Martín et al., 2014; Molina-Azorín, 2014), epistemology of SM (Antonio, 2013; Powell, 2001; Boyd et al., 2012), definitions of SM or strategy (Fréry, 2006; Nag et al., 2007) and methodologies and statistical techniques employed in SM research (Armstrong and Shimizu, 2007; Bergh and Fairbank, 2002; Boyd et al., 2005b, Boyd et al., 2005c; Brahma, 2009; Hahn and Doh, 2006; Hotker, 2006; Ketchen et al., 2008; Short et al., 2002).

Several quantitative studies have explored the intellectual and/or collaboration roots of SM by utilizing bibliometric methods. For example, co-citation analyses (see Nerur et al., 2015; Tan and Ding, 2015; Ramos-Rodriguez and Ruiz-Navarro, 2004; Nerur et al., 2008, Pilkington and Lawton, 2014; Di Stefano et al., 2010; Acedo et al., 2006b), bibliographic coupling analysis (Vogel and Güttel, 2013), multiple correspondence analysis (Furrer et al., 2008), co-authorship analysis (Ronda-Pupo and Guerras-Martín, 2010), and co-word analysis (Ronda-Pupo and Guerras-Martín, 2012) have been applied to identify changes in the intellectual structure of SM. Although there is an abundance of articles assessing the historical roots and evolution of SM (Kenworthy and Verbeke, 2015), the evolution of collaboration, particularly authorship and co-authorship, in the SM realm has not been previously addressed. Therefore, research focusing on the evolution of collaborations in the SM is needed. In this respect, for new and established researchers (Fernandez-Alles and Ramos-Rodríguez, 2009), the research objectives of this study are:

- to explore the evolution of authorship in the SM field by sub-periods.
- to visualize and identify the topologies of the overall co-authorship network of SM research to determine whether the networks in the SM field reflect the characteristics of a ''small world'' approach -reflecting the characteristics of social networks (Watts and Strogatz, 1998).
- to compare attributes of SM networks with those of other disciplines.
- to identify critical researchers in the co-authorship network of SM research.

The study is structured as follows. The first section is a review of the literature on bibliometrics and co-authorship, and an overview of bibliometric research in SM. The second section presents the methodology to explain how the database, document types, and journal were selected, and how the data were prepared and analyzed. In the third section, the authors present and discuss the results, focusing on the authorship patterns, author productivity, and ranking of authors, followed by a presentation of co-authorship by periods, a discussion of main component and core authors by periods, and an assessment of whether SM fits with a small-world network approach. Centrality metrics, including degree centrality, Bonacich's power index, closeness centrality, and betweenness centrality are evaluated. Finally, an inclusive evaluation of the results, limitations, and suggestions for future research is presented.

Literature review

Bibliometrics and co-authorship

Bibliometrics is a set of statistical methods to investigate the evolution of the sciences and/or disciplines by assessing the publication performance of authors and institutions and by mapping the structure and dynamics of the fields via data (e.g. citations, author names, key words, employed methods, used statistical techniques, etc.) obtained from written publications including books, journals, proceedings, articles, etc. (Cobo et al., 2011; McBurney and Novak, 2002; Ye et al., 2012; Zupic and Čater, 2015). Hence, it helps researchers minimize potential subjective biases, validate expert inferences, highlight leading thoughts and the interrelated connections between them (Nerur et al., 2008), correct errors of perception on history of various sciences, and scrutinize traditional dogmas (Callon et al., 1993) when they analyze the evolution of sciences.

Bibliometrics methods are categorized into two groups (Benckendorff and Zehrer, 2013). One group is called evaluative techniques and includes productivity measures (e.g. number of papers per academic year, number of papers per author), impact metrics (e.g. the total number of citations, number of citations per given period, number of citations per author), and hybrid metrics that both productivity and impact measures (e.g. the impact of collaboration in citations) (Benckendorff and Zehrer, 2013; Benckendorff, 2009; Hall, 2011). In the current study, several evaluative techniques (productivity measures), including number of author appearances, authors, papers per author, articles per author, multi authored articles, authors of multi-authored articles, a collaboration index, authorship pattern, Lotka's Law to measure author productivity, and dominance factor to rank authors, were used by providing details about their meanings and representations in the methodology section.

The other category of bibliometric methods is called relational techniques (Benckendorff and Zehrer, 2013) including co-citation, co-authorship (employed herein), co-word, and bibliographical coupling analysis, which are used to answer the following questions: (i) what is the intellectual structure of a discipline and how does it evolve based on co-citations and bibliographical coupling? (ii) What is the social structure of the discipline and how is it based on co-authorship considering the authors affiliations? (iii) What are the conceptual structures of the discipline based on co-word analysis (Zupic and Čater, 2015)?