

Ten Years of Strategic Management Studies: Perspective on the Invisible Network of Knowledge

Chen-Tsung Kuo, Yuan-Duen Lee, Yender Lee, and Cheng-Hua Wang

Abstract—The purpose of this paper is to map the intellectual structure of strategic management and to investigate the key concepts, themes, and their relationships with strategic management literature in the past decade. In this study, bibliometric and social network analysis techniques are used to investigate the intellectual pillars of the strategic management literature. By analyzing 303,402 citations of 4,616 articles published in SSCI journal in strategic management area between 2003 and 2012. The results of the mapping can help identify the research direction of strategic management research and provide a valuable tool for researchers to access the literature in this area.

Index Terms—Citation, co-citation, invisible knowledge network, strategic management

I. INTRODUCTION

If I have seen further, it is by standing on the shoulders of giants (Sir Issac Newton, 1645-1736). It's said "stand on the shoulders of giants (the under-box slogan of Google Scholar®)", we have realized via INK model could help a novice like a brand new doctoral student in nurture process to escape from vicious cycle of chick-egg with clear scientific map at hand first to navigate the blue ocean of knowledge domain in which novice is knowing nothing [1]:

- I don't know who are in that field.
- I don't know what theory in the field is.
- I don't know when they created good theories.

Several questions can, at this point, help us understand and illustrate the above discussion [2]:

- How is new knowledge created and disseminated?
- How do these developments correspond with the reality of knowledge creation?
- How can scholars and practitioners in the field use the resources of a knowledge network?

To approach these issues in a more objective manner, a generic model of invisible network of knowledge (INK) is proposed in this paper that can be used to map the intellectual structure in the strategic management area. The aim of this study is to provide strategic management researchers with a unique map to better understand strategic management related publications and to provide a systematic and objective mapping of different themes and concepts in the development of strategic management field. This study also attempts to help identify the linkage among different publications and confirm their status and positions in their contribution to the

development of strategic management field. The principal methods used are citation and co-citation analysis, social network analysis, plus a factor analysis which is performed to identify the invisible network of knowledge generation underlying the strategic management literature [3].

II. STUDIES OF ACADEMIC LITERATURE

There are a number of techniques that can be used to study a body of literature. Most frequent is the simple literature review where a highly subjective approach is used to structure the earlier work. Objective and quantitative techniques have recently become popular with more databases available online for use. These techniques adopt author citations, co-citations, and systematic review to examine the invisible knowledge network in the communication process by means of written and published works of a given field [4]. These techniques are attractive because they are objective and unobtrusive [5]. Several studies have used the bibliometric techniques to study the literature of management research. For example, Ponzi [6] explored the intellectual structure and interdisciplinary breadth of strategic management in its early stage of development, using principle component analysis on an author co-citation frequency matrix; Etemad [7] identified the most influential authors and studies in electronic commerce field by using citation analysis; Ramos-Rodriguez and Ruiz-Navarro [8] examined the intellectual structure change of strategic management research by conducting a bibliometric study of the Strategic Management Journal; Acedo and Casillas [9] explored the research paradigms of international management research by applying factorial analysis techniques in an author co-citation study. Chan, Seow and Tam [10] used citations from accounting dissertations completed during 2003-2012 to provide a ranking of accounting journals. To the best of our knowledge, no similar study has been conducted on the current research of innovation. Therefore this study aims to fill a gap in strategic management literature by applying citation and co-citation analysis to a representative sample of recent research on strategic management collected by the Science Citation Index and Social Sciences Citation Index.

III. METHODOLOGY

The research method used for this study is a theory-based citation and co-citation analysis. By introducing the INK model, the communication process embedded in the journal or book publications is described, which consists of 3 stages

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and each stage has its distinct features. This communication process is then applied to the strategic management field for the period of 2003-2012. Using citation analysis, the interlinked invisible nodes are discovered from which the most influential publications and scholars in the Strategic Management field are identified. Further, co-citation analysis is conducted to map the intellectual structure of Strategic Management studies and to explore the invisible knowledge nodes that have contributed most to the studies of Strategic Management and their possible evolution patterns.

The citation data used in this study included journal articles, authors, publication outlets, publication dates, and cited references. Citation and co-citation analysis is the main method for this study. First, the databases were identified as the sources of strategic management publications. Then data collection and analysis techniques were designed to collect information about topics, authors, and journals on strategic management research. In the second stage, the collected data were analyzed and systematized by sorting, screening, summing, sub-totaling, ranking. After a series of operations, key nodes in the invisible network of knowledge in strategic management were identified and the structures developed. In the final stage, the co-citation analysis was used and the knowledge network of strategic management was mapped to describe the knowledge distribution process in strategic management area.

With citation and co-citation analysis this model is able to explore the intellectual structure of any existent field, delineate its knowledge network, and further portrait its knowledge diffusion process. The invisible network of knowledge is defined in this paper as a set of interlinked invisible nodes represented by the publications with their frequency of citations as well as the correlations of different publications. Each set of such nodes serves a specific purpose for the study of Strategic Management or any other field of interest.

In this study, the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI) were used for analysis. The SCI and SSCI are widely used databases, which include citations published in over 8000 world's leading scholarly journals. While there are arguments that other online databases might also be used for such analysis, using SCI and SSCI provided the most comprehensive and the most accepted databases of strategic management publications.

Unlike other prior studies, the data used in this study were not drawn from journals chosen by peer researchers [11]. To map the intellectual structure of Strategic Management studies in the past decade, this study proposes a generic model of invisible network of knowledge through which the most important publications and the most influential scholars as well as the correlations among these publications can be identified. Then using 303,402 citations of 4,616 articles published in SSCI journals in Strategic Management area between 2003 and 2012, this study maps an invisible network of knowledge of Strategic Management studies.

IV. RESULTS

A. Citation Analysis

To identify the key publications and scholars that have laid down the ground work of strategic management research,

citation data were tabulated for each of the 4,616 source documents and 303,402 references using the Excel package. The citation analysis produced interesting background statistics, as shown in the following tables. Table I lists the most cited journals in strategic management area in the decade years, among which Strategic Management Journal (SMJ), Academy of Management Journal (AMJ) and Academy of Management Review (AMR) are the top three most cited journals, followed by Administrative Science Quarterly (ASQ). The general pattern of the most cited journals shows that strategic management research features strategic and management specific journals.

TABLE I: THE MOST FREQUENTLY CITED JOURNALS 2003-2012

Journals	Total Citations
STRATEGIC MANAGE J	20465
ACAD MANAGE J	12634
ACAD MANAGE REV	10694
ADMIN SCI QUART	7775
ORGAN SCI	7083
J MANAGE	5431
MANAGE SCI	5063
HARVARD BUS REV	4343
J MANAGE STUD	4237
J MARKETING	3403
J INT BUS STUD	3235
RES POLICY	2541
J APPL PSYCHOL	2351
J OPER MANAG	2283
CALIF MANAGE REV	2123

The most influential documents with the most citation and the most influential scholars were then identified by their total counts of citation within the selected journal articles. As shown in Table II, the most cited strategic management publication between 2003 and 2007 (the first five years) was "BARNEY J, 1991, J MANAGE, V17, P99 ", "Teece DJ, 1997, STRATEGIC MANAGE J, V18, P509 "and" Porter M. E., 1980, COMPETITIVE STRATEGY." (See Table II).

TABLE II: HIGHLY CITED DOCUMENTS: 2003-2007

Total Citations	Full Citation Index For Document
316	BARNEY J, 1991, J MANAGE, V17, P99
259	Teece DJ, 1997, STRATEGIC MANAGE J, V18, P509
202	Porter M. E., 1980, COMPETITIVE STRATEGY
178	WERNERFELT B, 1984, STRATEGIC MANAGE J, V5, P171
169	COHEN WM, 1990, ADMIN SCI QUART, V35, P128
159	Nelson R., 1982, EVOLUTIONARY THEORY
135	Penrose E., 1959, THEORY GROWTH FIRM
128	DIERICKX I, 1989, MANAGE SCI, V35, P1504
127	Eisenhardt KM, 2000, STRATEGIC MANAGE J, V21, P1105
126	PRAHALAD CK, 1990, HARVARD BUS REV, V68, P79

For the second five years (2008-2012), as shown in Table III, the most cited Strategic management publication was "Barney J, 1991, Manage J, v17, p99" and "Teece DJ, 1997, Strategic Manage J, v18, p509". The third most cited was "Wernerfelt B, 1984, Strategic Manage J, v5, p171" (See Table III).

TABLE III: HIGHLY CITED DOCUMENTS: 2008-2012

Total Citations	Full Citation Index For Document
567	BARNEY J, 1991, J MANAGE, V17, P99
455	Teece DJ, 1997, STRATEGIC MANAGE J, V18, P509
274	WERNERFELT B, 1984, STRATEGIC MANAGE J, V5, P171
263	Eisenhardt KM, 2000, STRATEGIC MANAGE J, V21, P1105
250	COHEN WM, 1990, ADMIN SCI QUART, V35, P128
229	Porter M. E., 1980, COMPETITIVE STRATEGY
218	Penrose E., 1959, THEORY GROWTH FIRM
216	EISENHARDT KM, 1989, ACAD MANAGE REV, V14, P532
211	Nelson R., 1982, EVOLUTIONARY THEORY
200	March JG, 1991, ORGAN SCI, V2, P71

Journal articles and books combined, the top five most cited scholar between 2003 and 2007 (the first five years) were Eisenhardt KM, Teece DJ, Barney J, Miller D, Porter M. E. (see Table IV). For the second five years (2008~2012), the status of the most important scholars changed. The top five most cited scholars were Eisenhardt KM, Teece DJ, Barney J, Hambrick DC, Miller D (see Table V). These scholars have the most influence in the development of Strategic management area and thus collectively define this field. Their contributions represent the focus of the main research in the field and thus give us an indication of the popularity of certain Strategic management topics as well as their historical values.

TABLE IV: HIGHLY CITED AUTHORS 2003-2007

Author	Frequency	Author	Frequency
Eisenhardt KM	551	HAMBRICK DC	302
Teece DJ	495	GRANT RM	298
BARNEY J	341	GULATI R	240
MILLER D	330	PORTER ME	239
Porter M. E.	316	Pfeffer J.	233
KOGUT B	312	MINTZBERG H	231

TABLE V: HIGHLY CITED AUTHORS 2008-2012

Author	Frequency	Author	Frequency
EISENHARDT KM	1003	KOGUT B	501
Teece DJ	872	GRANT RM	471
BARNEY J	631	Gulati R	420
HAMBRICK DC	545	Porter M. E.	406
Miller D	538	Dyer JH	369
Zahra SA	533	Podsakoff PM	363

Although the citation analysis does not eliminate the bias against younger scholars, a paper-based ranking (as in Table II & III) places more emphasis on the quality (as opposed to the quantity) of the documents produced by a given scholar than a ranking of authors based on the frequencies with which a particular author has been cited (as in Table IV & V). In addition, Table II and III represent the key research themes in a field and give us an indication of the popularity of certain strategic management topics. The readers can find high citations are associated to what can be termed field-defining titles and they lay down the ground work for the understanding of strategic management as a distinct phenomenon. A comparison between Table II and III reveals some interesting patterns from the first five years (2003-2007) to the second five years (2008-2012). First, the top five most influential publications in the last five have been changed,

indicating their dominant status for the past decade in strategic management studies. Second, on the one hand, the most cited publications in the first five years have relatively smaller number of citations, comparing with the publications in the second five years.

The gradual increase in the total citations supports the evolving process of strategic management research as an academic field and the process of gaining more and more recognition in the literature. On the other hand, the most influential papers and authors in the first five years and the second five years have changed much. This indicates the development in strategic management is very rapid. More efforts and theoretical breakthrough are thus needed in order to further advance the development of strategic management research.

TABLE VI: AUTHOR FACTOR LOADINGS 2003-2007

Factor 1: (61.30%) Performance Management		Factor 2: (14.70%) Knowledge Management	
Author	Variance	Author	Variance
Eisenhardt KM	0.931	Huselid MA	0.644
Porter M.E.	0.925	Nelson R.	0.616
Prahalad CK	0.916	Hambrick DC	0.591
Hitt MA	0.893	Wright PM	0.563
Grant RM	0.89	Cohen WM	0.543
March JG	0.873	Dess GG	0.516
Gulati R	0.862	Mintzberg H	0.509
Kogut B	0.861		
Burgelman RA	0.851		
Teece DJ	0.84		
Wernerfelt B	0.836		
Venkatraman N	0.834		
Barney J	0.828		
Child J	0.819		
Zahra SA	0.816		
Nonaka I	0.815		
Cohen WM	0.774		
Dyer JH	0.766		
Hambrick DC	0.743		
Mintzberg H	0.723		
Pfeffer J.	0.708		
Dess GG	0.701		

B. Co-Citation Analysis

In this stage, data mapping was conducted and an intellectual structure of current strategic management studies was revealed. Co-citation analysis is a bibliometric technique that information scientists use to map the intellectual structure of an academic field. It involves counting documents from a chosen field - paired or co-cited documents. Co -citation analysis compiles co-citation counts

in matrix form and statistically scales them to capture a snapshot at a distinct point in time of what is actually a changing and evolving structure of knowledge [12].

Co-citations were tabulated for each source documents by using the Excel package. Many of the authors had very few co-citations that were either unlikely to have had a significant impact on the development of the field or were too new to have had time to impact on the literature. To facilitate analyses and improve the probability of its success, it was made sure that all authors in the final set had at least 30 citations in the first five years and 30 in the second five years. Based on the total number of citations in the selected journals, the top scholars were identified, and then a co-citation matrix was built before a pictorial map was drawn to describe the correlations among different scholars. In doing so, we were following the procedures recommended by White and Griffith [13].

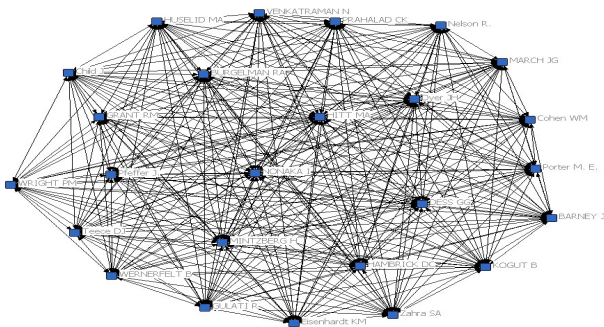


Fig. 1. Key research themes in strategic management (2003-2007)

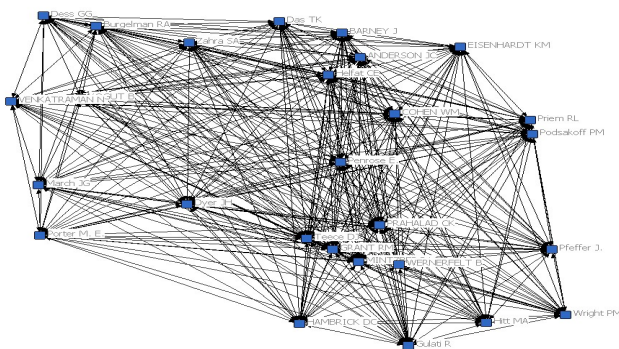


Fig. 2. Key research themes in strategic management (2008-2012)

Social network analysis techniques were used to graph the relationships in the co-citation matrix and identify the strongest links [14]. Fig. 1 and Fig. 2 show the core research themes in strategic management studies, based on sampled articles with links of greater than or equal to ten co-citations shown in the network. This is produced using UCINET software [15] and shows graphically the core areas of interest. Different shapes of the nodes result from performing a faction study of these authors. This method seeks to group elements in a network based on the sharing of common links to each other. The diagrams show that current research in strategic management area is concentrating on the sinter actions of essential of value relevance, positive strategic management theory, Country- specific factors. The few scholars in Fig. 1 and 2 with the most links (co-citation) are the super stars in strategic management research. Their heavy citations and intensive interlinks with each other undoubtedly

indicate their prestigious status in strategic management research and their publications and research work collectively define the future research directions of strategic management studies.

TABLE VII: AUTHOR FACTOR LOADINGS 2008-2012

Factor 1: (63.70%) Performance Management		Factor 2: (10.80%) Knowledge Management	
Author	Variance	Author	Variance
Prahalad CK	0.935	Anderson JC	0.584
March JG	0.924	Wright PM	0.542
Eisenhardt KM	0.92	Hambrick DC	0.539
Porter M.E.	0.918	Pfeffer J.	0.506
Barney J	0.915	Podsakoff PM	0.505
Hitt MA	0.914		
Grant RM	0.909		
Helfat CE	0.9	Factor 3 (8.80%)	Strategic Human
Teece DJ	0.891	Author	Variance
Zahra SA	0.89	Das TK	0.662
Cohen WM	0.883	Dyer JH	0.579
Kogut B	0.882	Anderson JC	0.518
Burgelman RA	0.832		
Penrose E.	0.824		
Wernerfelt B	0.813		
Venkatraman N	0.795		
Priem RL	0.792		
Gulati R	0.782		
Dyer JH	0.749		
Pfeffer J.	0.729		
Hambrick DC	0.721		
Dess GG	0.71		
Mintzberg H	0.698		
Das TK	0.633		

While the diagrams in Fig. 1 and Fig. 2 provide a clear picture, their foci are only on the very core areas and only a limited amount of information is revealed. By taking the co-citation matrix and grouping the authors using factor analysis of the correlations between the entries, we can determine which authors are grouped together and therefore share a common element. According to this, the closeness of author points on such maps is algorithmically related to their similarity as perceived by cited. We use r-Pearson as a measure of similarity between author pairs, because it registers the likeness in shape of their co-citation count profiles over all other authors in the set [16].

The co-citation correlation matrix was factor analyzed using varimax rotation, a commonly used procedure, which attempts to fit (or load) the maximum number of authors on the minimum number of factors. The diagonals were considered missing data and were applied the criterion of

omitting the two cases [17].

Similarly, studies on strategic management also clustered on different research themes between 2008 and 2012 and together they explained over 83.3% of the variance in the correlation matrix of the second five years, as Fig. 2. Table VII lists the three most important factors along with the authors that had a factor loading of at least 0.5. We also tentatively assigned names to the factors on the basis of our own interpretation of the authors with high associated loadings. Our interpretation of the analysis results is that strategic management research at this stage is also composed of at least three key subfields: Performance Management, Knowledge Management, and And Strategic Human.

V. CONCLUSION

The mapping of the intellectual structure of strategic management studies indicates that strategic management has somehow created its own literature and that it has gained the reputation as a legitimate academic field, with strategic management specific journals gaining the status required for an independent research field. Given that the strategic management is still young and our analysis has shown that it has an evolving structure, it is believed that Strategic management publication outlets will gain more popularity and prestige that is required to become a more prominent academic field when we learn more about current paradigms and the key research themes in strategic management studies, how they relate, and what they stand for. With more scholars and more resources contributing to the strategic management area, a better academic environment conducive for research ideas' cross-fertilizing will be formed and strategic management, as a field, will gain more momentum for further development.

The objective of this study is to provide Strategic Management researchers with a unique tool for evaluating Strategic Management related publications and to provide a systematic and objective means of determining the relative importance of different knowledge nodes in the development of the Strategic Management field. This study also attempts to help researchers identify the linkage among different publications and confirm the status of each publication in their contribution to the Strategic Management field [18].

VI. LIMITATIONS AND FUTURE RESEARCH

First, Factors such as the reputation of the cited author and the visibility, prestige, and accessibility of the cited publications may affect the work an author chooses to cite. In particular, time is an important factor that may make some new titles at disadvantage. Therefore, the proposed INK model must be applied with these considerations in mind and its results must be interpreted within the framework of the relevant decision to be made or the hypothesis to be examined.

The second limitation of this study is the selection of time period. Since time influences the results of such studies, the time limit for the publications studied here is set to the year of 2003-2012, which might affect the generalization of this

study. Choosing the time period is a topic of debate. The authors chose the period of 2003-2012 because it represents the most current and updated Strategic Management research data. Future research may use the data of other period of interest.

To overcome the limitations associated with citation analysis, future research is encouraged to combine the method of citation analysis with content analysis. Content analysis is a research tool used to determine the presence of certain words or concepts within texts or sets of texts. With a methodology combining both citation analysis and content analysis, the proposed INK model will be playing an even more important role in studying Strategic Management and other interdisciplinary fields [19].

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