

CHANGES IN THE INTELLECTUAL STRUCTURE OF STRATEGIC MANAGEMENT RESEARCH: A BIBLIOMETRIC STUDY OF THE *STRATEGIC MANAGEMENT JOURNAL*, 1980–2000

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The aim of this paper is to identify the works that have had the greatest impact on strategic management research and to analyze the changes that have taken place in the intellectual structure of this discipline. The methodology is based on the bibliometric techniques of citation and co-citation analysis which are applied to all the articles published in the Strategic Management Journal from its first issue in 1980 through 2000. Copyright © 2004 John Wiley & Sons, Ltd.

... a statistical record of ideas ... would allow us to identify the precise moment in history that ideas emerge, chronicle their growth and spread, determine the exact duration of their validity in the collective mind and afterwards trace their path towards decline, erosion into mere cliché and ultimate disappearance beyond the horizon of time. (Ortega y Gasset, 1967)

INTRODUCTION

Once a scientific discipline has reached a certain degree of maturity, it is common practice for its scholars to turn their attention towards the literature generated by the scientific community and, treating it as a research topic in its own right, to conduct reviews of the literature with a view to assessing the general state of the art. Normally, these types of study are considered as adopting the impressionist approach and their findings tend to reflect the subjective views of their authors.

Keywords: strategic management research; bibliometrics; co-citation analysis

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The purpose of this paper is to gain an impression of strategic management research and its evolution by considering the works of a great number of researchers in the field over an extended period of time using bibliometric methods. The aim, following the suggestion of White and McCain (1998), is to ascertain how the discipline has evolved by focusing on and describing what appears, as it were, in the rear-view mirror.

The term *bibliometrics* refers to the mathematical and statistical analysis of patterns that appear in the publication and use of documents (Diodato, 1994). The techniques used in this paper are known as citation and co-citation analysis. Citation analysis is based on the premise that authors cite documents they consider to be important in the development of their research. Therefore, frequently cited documents are likely to have exerted a greater influence on the discipline than those less frequently cited (Culnan, 1987; Tahai and Meyer, 1999).

Similarly, co-citation analysis of documents records the number of papers that have cited any particular pair of documents and it is interpreted as a measure for similarity of content of the two documents. The approach is instrumental in identifying groupings of authors, topics, or methods

and can help us understand the way in which these clusters interrelate (Pilkington and Liston-Heyes, 1999). White and Griffith (1981), McCain (1990), and White and McCain (1998) give a detailed description of this procedure for author co-citation analysis. Its validity as a means of exploring the intellectual structure of a scientific discipline has been amply demonstrated in numerous studies (Small, 1973; White and Griffith, 1981; McCain, 1986; Culnan, O'Reilly, and Chatman, 1990; White and McCain, 1998; Ding, Chowdhury, and Foo, 1999).

Therefore, starting from the hypothesis that the bibliographic references cited in research papers are a reliable indication of their influence, the aim of the present study is to identify the more influential documents and analyze the relational links between them, in order to appreciate the changes that have taken place in the intellectual structure of strategic management research.

Useful value added is offered by this paper, not only because it is the first to apply bibliometric techniques to strategic management research literature, but also because, in so doing, it complements and improves the findings of other studies that have approached the subject from the qualitative perspective. It is, however, no substitute for extensive reading and fine-grained content analysis (White and McCain, 1998).

The paper is divided into four main sections. The first is a review of literature; the second contains a description of the methodology employed, in particular, the co-citation technique; the third presents and discusses the results of the empirical study; and, finally, the fourth section presents a summary and discussion of the conclusions to be drawn from this investigation, indicates its limitations, and suggests future research.

LITERATURE REVIEW

Several articles report the use of bibliometric techniques to study other areas of management research. For example, Culnan (1987) maps the intellectual structure of Information Systems Management research by conducting a co-citation analysis of works published by a series of authors who could be considered representative of the discipline; Culnan *et al.* (1990) explore the structure of Organizational Behavior research by applying factorial analysis techniques in an author co-citation

study; Hoffman and Holbrook (1993) examine the intellectual structure of Consumer Research by conducting a bibliometric study of the *Journal of Consumer Research*; Üsdiken and Pasadeos (1995) investigate the reasons that lead European and North American authors to select different paths of research in the field of Organization Studies; Pasadeos, Phelps, and Kim (1998) identify the most influential authors and works in advertising research and describe the co-citation networks that exist between them; Tahai and Meyer (1999) published a journal citation analysis in the *Strategic Management Journal* to identify the most influential journals in the field of Management; Pilkington and Liston-Heyes (1999) use bibliometric techniques (factorial analysis of co-citation matrix) to investigate the intellectual pillars of the Production and Operations Management literature and explore whether these are distinct from those commonly associated with its rival fields: Operations Research, Management Science, and Industrial Engineering. Ramos-Rodríguez and Ruíz-Navarro (2000) explore the intellectual structure of Strategic Change research by conducting an author, work, and journal co-citation analysis of a 30-year period. Recently, Ponzi (2002) has explored the intellectual structure and interdisciplinary breadth of Knowledge Management in its early stage of development, using principal component analysis on an author co-citation frequency matrix.

To the best of our knowledge, no such study has dealt with the field of strategic management research; therefore this paper aims to fill a gap in strategic management literature by applying bibliometric techniques to a representative collection of research articles relating to this disciplinary area, with the intention of complementing and enhancing the findings of other studies that have described it from a more qualitative perspective.

METHODOLOGY

Instead of using books, doctoral theses, or scientific congress records as our source of scientific documents for the purposes of this study, we chose to use articles published in a journal, because these can be considered 'certified knowledge.' This is the term commonly used to describe knowledge that has been submitted to the critical review of

fellow researchers and has succeeded in gaining their approval. Research articles play a fundamental role in the said certification process (Callon, Courtial, and Penan, 1993). The use of citations from articles in research journals, moreover, is a standard practice that enhances the reliability of results.

To obtain a representative collection of strategic management research articles, we decided to take all the articles published in the *Strategic Management Journal (SMJ)* from its first issue in 1980 through 2000. The reasoning behind this choice can be summarized as follows: (1) by their nature, all the published articles address strategic management issues, which saves us the arduous task of sifting through other journals in search of articles relating to the discipline that concerns us; (2) this publication enjoys a reputation as a leader among management journals, particularly those dealing with business strategy (Tahai and Meyer, 1999); (3) it is highly regarded by researchers in the field; (4) being a publication that is unrestricted in its willingness to accept contributions, it is a true reflection of the current topics of scientific interest; (5) its entire contents are to be found in databases of the type required for citation analysis techniques.

There is, however, some bias involved in this choice. A large number of journals publish articles dealing with issues of strategy, but, since they are not specialized in strategic management, a laborious selection process would be required in order to find articles dealing exclusively with strategic management. Nor have all of these journals been copied onto databases of the type required for this kind of research. We are, however, reasonably confident that the articles analyzed are a representative sample of strategic management research.

The *SMJ* serves to define the development of this field (Hoskisson *et al.*, 1999) and signifies the field's move towards a new paradigm, by which it has become a more 'scientific,' empirically oriented research discipline (Schendel and Hofer, 1979). By using the *SMJ*, therefore, our study covers the period during which the discipline has achieved its full development.

Moreover, since it was our aim to assess changes in influence of the most cited works, it was necessary to divide the study period into a number of sub-periods. Accordingly, bearing in mind that it was not our intention to identify real periods

but simply to register changes over the course of time, we opted to divide the study period into three equal and consecutive sub-periods, each spanning 7 years.

From the Social Science Citation Index¹ via CICA (Andalusian Centre for Scientific Data), we retrieved the set of all articles published in the *SMJ* from 1980 through 2000. We then created a file with all the references cited in the said articles. There are, however, certain inconsistencies² in the coding used in the database. Since the bibliometric software³ employed in this study recognizes only exactly coinciding strings of characters, a manual normalization process is required in order to guarantee accuracy, especially in the spelling of authors' names, the journals in which the articles appear, and the first edition of each book cited.

Bibliometric analyses have traditionally been divided into two categories, according to whether they yield activity or relationship indicators. The former provide data relating to the force of impact or strength of influence of research efforts, while the latter trace the links and interaction between different researchers and different fields of research. The end result is a full description of the content of the research effort and its development (Callon *et al.*, 1993). Citation and co-citation analysis, respectively, are the techniques most frequently used to obtain these indicators.

The study was conducted in two separate stages (Figure 1). The first stage was a citation analysis to compute the frequency of citation of the bibliographic references used in all the articles analyzed, in order to identify the works that had made most impact on the scientific community. The sample period of 21 years was then divided into three equal, consecutive 7-year sub-periods: 1980–86, 1987–93, and 1994–00, and the study

¹ *Social Science Citation Index (SSCI)* is a database that records not only the title, authors, source, keywords, and other data relating to each article but also the bibliographic references contained in it. It is, therefore, an index of citations managed by the U.S. *Institute for Scientific Information (ISI)*, which has registered the contents of approximately 4100 journals of worldwide distribution dating back to 1972.

² Thus, we find that 'PORTER ME, 1980, COMPETITIVE STRATEGY' and 'PORTER M, 1980, COMPETITIVE STRATEGY' are two citations of the same well-known work by Michael E. Porter; in the first citation the author's name is coded with two initials and in the second with only one.

³ We used BIBEXCEL software, designed by Professor Olle Persson of the Institute of Information Sciences at the University of Umeå (Sweden).

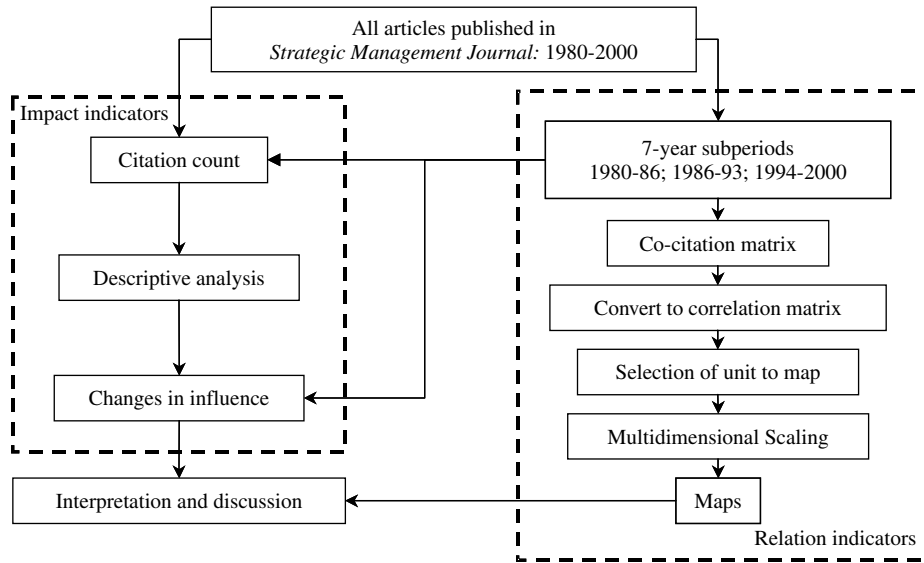


Figure 1. Design of the empirical study

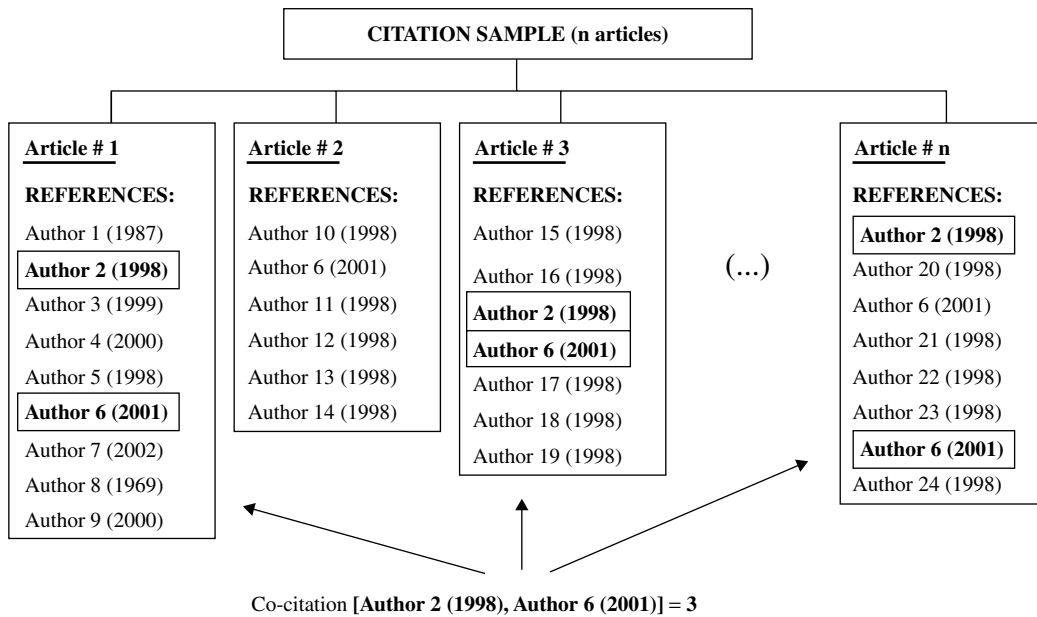


Figure 2. Co-citation count

was repeated in order to observe any changes that might have taken place in the influence of these works.

The second stage was to perform a co-citation analysis based on the most cited document of the whole sample period (1980–2000), and of each of the sub-periods, in order to trace relationships

between them and identify schools of thought and prevailing topics of research.

Co-citation analysis is based on the distribution frequencies obtained from the citations count, by forming all the pairs possible from the 100 most frequently cited documents and counting all the articles that cite both documents (Figure 2). These

counts are then arranged on a 100×100 square symmetrical matrix in which the main diagonal remains undefined (because there is no point in counting the co-citation of a document with itself). The analysis is limited to the 100 most cited documents because the software used does not permit calculation of correlations matrices of greater dimensions.

Once the co-citation counts were obtained, we used the computer techniques described in McCain (1990) to map the intellectual structure of the discipline. According to this, the closeness of document points on such maps is algorithmically related to their similarity as perceived by citers. We use r-Pearson as a measure of similarity between document pairs, because it registers the likeness in shape of their co-citation count profiles over all other documents in the set (White and McCain, 1998).

The use of r-Pearson as a measure of similarity rather than the raw co-citation frequency offers at least two advantages: (1) for any given pair of documents, Pearson's correlation coefficient serves as a measure, not of the frequency with which the two were cited (raw citation frequency), but of the degree of similarity between their co-citation profiles and those of the rest of the works considered: two works that are always co-cited along with a third, but rarely with any others, will have strong positive correlation and can be said to be considered by the citing population to have some relationship or similarity to one another. Secondly, the correlation coefficient also overcomes differences of scale between a document that is very frequently cited and other very similar ones less frequently cited, because this fact would limit their possibility of being co-cited (Kerlinger, 1973; White and McCain, 1998).

There are two ways to treat the main diagonal when calculating correlation coefficients. The first of these involves taking the sum of the three highest scores and dividing them by two, which gives an overall indication of the relative importance of a given work within the field (White and Griffith, 1981); the other option (McCain, 1990) is simply to consider it missing data and to apply the criterion of omitting the two cases (*pairwise delete*). For the purposes of this study, after trying both these methods, we have taken the second option because no significant differences were seen in the resulting configurations. For this reason and for the sake of simplicity, we decided to ignore the

scores on the main diagonal when calculating the correlation coefficients for the pairs of documents.

The next step in the process was to plot the data in a sufficiently reduced space to form a readable graph. For this we decided to use multidimensional scaling, henceforth MDS, which requires the use of a similarity matrix. It is a procedure by which maps are made from the correlation matrix of the items under analysis in order to explore the structure underlying the whole set of items. MDS, therefore, gives a table with the coordinates for each document plotted on a two-dimensional plane. Its main purpose is to collate the maximum amount of information from the original data in only two or three dimensions; in other words, to reduce the spatial dimension. This simplification inevitably distorts the original distances and cannot fully account for all the variance that appears in the proximity matrix.

The software package used in this case summarizes the variance in terms of a goodness of fit index known as 'stress',⁴ which represents the approximate difference between points in the original pattern and how they appear in the final one. This index can be complemented with *Sheppard's diagram*.⁵

The stress value depends on the number of items analyzed and their original configuration, such that for a given initial configuration the stress index increases with the number of items analyzed; in other words, the more items that are mapped, the poorer the goodness of fit. This fact was decisive in determining the number of documents that were selected for mapping. Figure 3 gives the stress values for the numbers of items mapped in each of the periods analyzed. We decided to map the 50 documents most frequently cited between 1980 and 2000 and the 20 most cited during each of

⁴ The raw stress value of a configuration is defined by: $\text{stress} = \sum [d_{ij} - f(\delta_{ij})]^2$, where d_{ij} denotes the reproduced distances, given the respective number of dimensions, and δ_{ij} denotes the input data (i.e., observed distances). The expression $f(\delta_{ij})$ indicates a non-metric, monotone transformation of the observed input data (distances). Thus, the smaller the stress value, the better the fit of the reproduced distance matrix to the observed distance matrix (STATISTICA VI Manual).

⁵ In a Sheppard diagram the original distances are plotted on the x -axis and the distances that appear in the new arrangement on the y -axis. With the appropriate scale, a cluster of points arranged in a diagonal line will be indicative of goodness of fit.

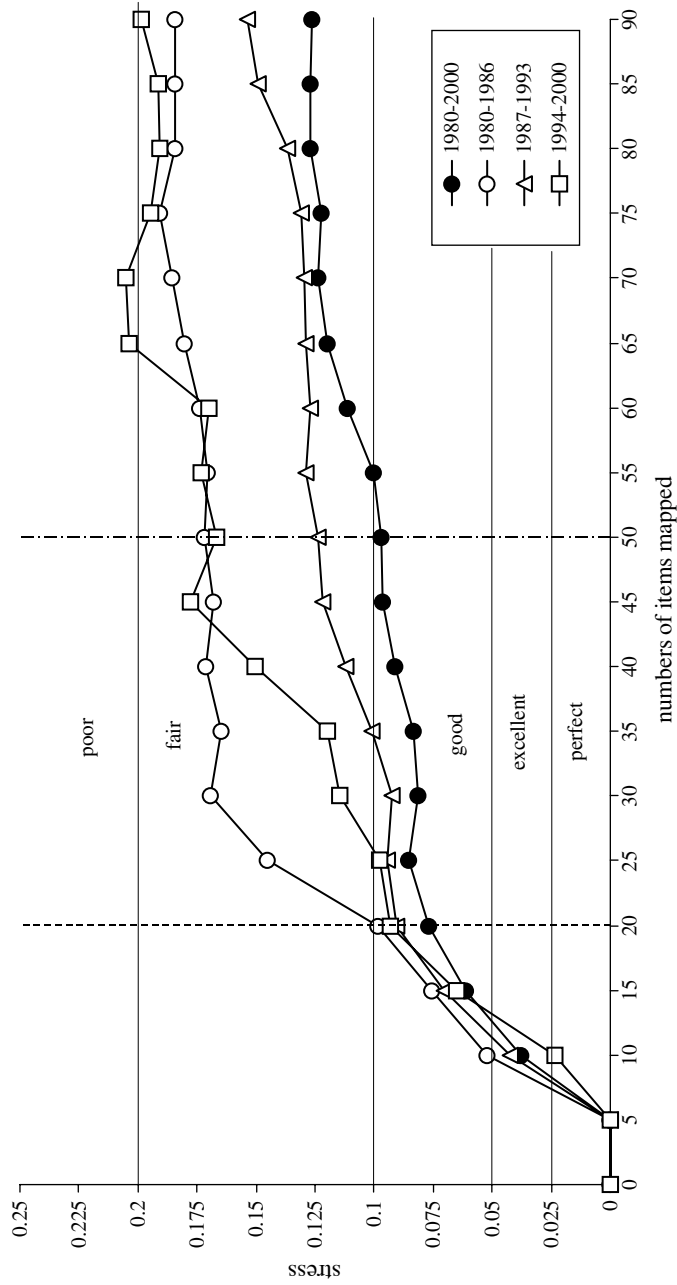


Figure 3. Relation between numbers of items mapped and stress values

the sub-periods because the resulting stress value is indicative of a good fit.⁶ Note that more items could have been included on each map, but we decided to include only as many documents as would yield acceptable goodness of fit indices; that is, we opted for quality in terms of goodness of fit rather than quantity in the number of documents that were mapped.

RESULTS AND DISCUSSION

This section contains the results of the citation and co-citation analyses of the bibliographic references made by the 1045 authors in the 870 articles published in the *SMJ* from its foundation in 1980 through 2000. As we have explained in the section on methodology, in order to highlight changes in the intellectual basis this set of articles was divided into three subsets: one for each of the sample sub-periods. The first comprised 165 articles published in the issues that appeared between 1980 and 1986; the second, a total of 324 works published between 1987 and 1993; and the third, 381 articles published in the last sub-period, 1994–2000. In all 41,674 bibliographic references to 21,696 different works were analyzed, giving an average of 47.9 references per article.

A preliminary study of the citations showed that by far the most frequently cited publication was the *SMJ* (Table 1), a fact which compensates for some of the bias resulting from not including more journals in the study.

Moreover, the frequency distribution of the dates of the citations analyzed (Figure 4) reveals that most of the cited works were published from the mid-1970s onwards; that is, at a time that largely coincides with our study period.

The most influential works in strategic management research: 1980–2000

The first and second columns in Table 2 show the 50 most cited works and their frequency in the articles published in the *SMJ* during the 21 years covered by the study, arranged in order of the number of citations.

Obviously, the works of earliest date have been available to the scientific community for the

Table 1. Journal citation frequency

Cited journal	Citations received	Relative frequency
<i>Strategic Management Journal</i>	3930	17.6%
<i>Academy of Management Journal</i>	1717	7.7%
<i>Administrative Science Quarterly</i>	1649	7.4%
<i>Academy of Management Review</i>	1311	5.9%
<i>Harvard Business Review</i>	836	3.7%
<i>Management Science</i>	783	3.5%
<i>Journal of Financial Economics</i>	474	2.1%
<i>American Economic Review</i>	461	2.1%
<i>Journal of Management</i>	384	1.7%
<i>Organizational Science</i>	349	1.6%
Others journals cited	10,411	46.7%
Total cites to journal's articles	22,305	100.0%

longest time and thus, strictly speaking, have the most opportunity of being cited. This could bias results but only to a limited degree, in our view, because influence is a construct that depends on the passing of time; in other words, in order to be considered influential, a work not only has to accumulate citations but has to do so over a fairly lengthy period of time.

A few remarks regarding the data thus obtained:

- Of the 20 most frequently cited works, 18 were published in book form and only two as articles in journals. Given that most of the articles that appear in the journal considered in this study are North American in origin, this indicates a contrast with the findings of Üsdiken and Pasadeos (1995), regarding the tendency among authors of that nationality to use articles published in journals as their source of data for research work and therefore to rely more heavily on empirical studies.
- Porter (1980, 1985) represents a contribution to industrial economics, in particular, the structure–conduct–performance paradigm, of such weight as to place this author at the forefront of those influencing strategic management research during the period considered.
- The two articles included among the 20 most influential works were written by Wernerfelt (1984) and Barney (1991). The former was the pioneer of the resource-based view of the firm, while the latter advanced this by developing a model for identifying the features of strategic resources and thus for defining those constituting a source of competitive advantage. There is

⁶ Kruskal (1964) suggests interpreting 'stress' values as follows: 0 = perfect; 0.025 = excellent; 0.05 = good; 0.1 = fair; 0.2 = poor.

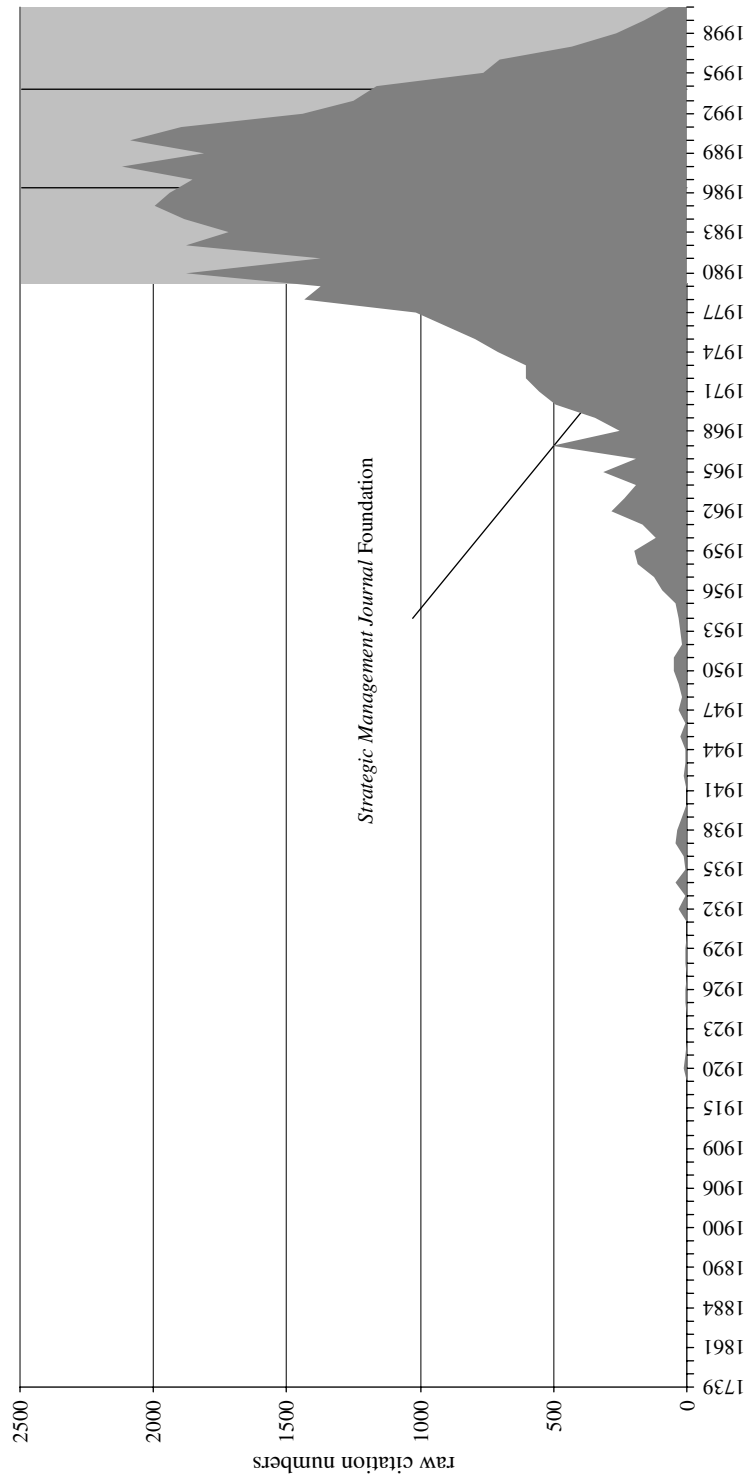


Figure 4. Frequency distribution of citation dates

Table 2. Raw and relative citation frequency

Rank	Document cited	1980–2000 <i>n</i> = 870		1980–86 <i>n</i> = 165		1987–93 <i>n</i> = 324		1994–2000 <i>n</i> = 381	
1	Porter (1980)	266	30.6%	41	24.8%	121	37.3%	104	27.3%
2	Rumelt (1974)	166	19.1%	40	24.2%	83	25.6%	43	11.3%
3	Porter (1985)	135	15.5%	0	0.0%	60	18.5%	75	19.7%
4	Chandler (1962)	131	15.1%	35	21.2%	56	17.3%	40	10.5%
5	Williamson (1975)	131	15.1%	13	7.9%	62	19.1%	56	14.7%
6	Nelson and Winter (1982)	114	13.1%	0	0.0%	40	12.3%	74	19.4%
7	Pfeffer and Salancik (1978)	107	12.3%	19	11.5%	38	11.7%	50	13.1%
8	Miles and Snow (1978)	105	12.1%	20	12.1%	52	16.0%	33	8.7%
9	Cyert and March (1963)	103	11.8%	25	15.2%	41	12.7%	37	9.7%
10	Thompson (1967)	103	11.8%	27	16.4%	43	13.3%	33	8.7%
11	Hofer and Schendel (1978)	101	11.6%	39	23.6%	44	13.6%	18	4.7%
12	Wernerfelt (1984)	95	10.9%	1	0.6%	15	4.6%	79	20.7%
13	Barney (1991)	88	10.1%	0	0.0%	5	1.5%	83	21.8%
14	Lawrence and Lorsch (1967)	88	10.1%	22	13.3%	35	10.8%	31	8.1%
15	Andrews (1971)	80	9.2%	18	10.9%	34	10.5%	28	7.3%
16	Penrose (1959)	76	8.7%	3	1.8%	22	6.8%	51	13.4%
17	Ansoff (1965)	75	8.6%	28	17.0%	30	9.3%	17	4.5%
18	Williamson (1985)	72	8.3%	0	0.0%	28	8.6%	44	11.5%
19	Scherer (1980)	67	7.7%	5	3.0%	27	8.3%	35	9.2%
20	Quinn (1980)	66	7.6%	10	6.1%	40	12.3%	16	4.2%
21	Prahalad and Hamel (1990)	64	7.4%	0	0.0%	19	5.9%	45	11.8%
22	Dierickx and Cool (1989)	63	7.2%	0	0.0%	7	2.2%	56	14.7%
23	Jensen and Meckling (1976)	63	7.2%	2	1.2%	26	8.0%	35	9.2%
24	Weick (1969)	61	7.0%	6	3.6%	26	8.0%	29	7.6%
25	March and Simon (1958)	59	6.8%	10	6.1%	24	7.4%	25	6.6%
26	Mintzberg (1978)	58	6.7%	7	4.2%	39	12.0%	12	3.1%
27	Bower (1970)	50	5.7%	13	7.9%	21	6.5%	16	4.2%
28	Child (1972)	50	5.7%	8	4.8%	19	5.9%	23	6.0%
29	Aldrich (1979)	49	5.6%	6	3.6%	24	7.4%	19	5.0%
30	Barney (1986)	49	5.6%	0	0.0%	7	2.2%	42	11.0%
31	Hannan and Freeman (1984)	47	5.4%	0	0.0%	18	5.6%	29	7.6%
32	Lippman and Rumelt (1982)	47	5.4%	1	0.6%	20	6.2%	26	6.8%
33	Mintzberg <i>et al.</i> (1976)	46	5.3%	14	8.5%	21	6.5%	11	2.9%
34	Burns and Stalker (1961)	45	5.2%	14	8.5%	20	6.2%	11	2.9%
35	Cohen and Levinthal (1990)	45	5.2%	0	0.0%	6	1.9%	39	10.2%
36	Hambrick and Mason (1984)	45	5.2%	0	0.0%	26	8.0%	19	5.0%
37	Rumelt (1984)	45	5.2%	0	0.0%	13	4.0%	32	8.4%
38	Buzzell <i>et al.</i> (1975)	44	5.1%	23	13.9%	17	5.2%	4	1.0%
39	Tushman and Anderson (1986)	44	5.1%	0	0.0%	15	4.6%	29	7.6%
40	Hannan and Freeman (1977)	43	4.9%	3	1.8%	21	6.5%	19	5.0%
41	Schendel and Hofer (1979)	43	4.9%	16	9.7%	18	5.6%	9	2.4%
42	Palepu (1985)	42	4.8%	0	0.0%	21	6.5%	21	5.5%
43	Rumelt (1991)	41	4.7%	0	0.0%	7	2.2%	34	8.9%
44	Christensen and Montgomery (1981)	40	4.6%	4	2.4%	28	8.6%	8	2.1%
45	Wrigley (1970)	40	4.6%	19	11.5%	16	4.9%	5	1.3%
46	Peteraf (1993)	39	4.5%	0	0.0%	0	0.0%	39	10.2%
47	Porter (1987)	39	4.5%	0	0.0%	19	5.9%	20	5.2%
48	Rumelt (1982)	39	4.5%	5	3.0%	28	8.6%	6	1.6%
49	Teece (1982)	38	4.4%	0	0.0%	16	4.9%	22	5.8%
50	Caves and Porter (1977)	37	4.3%	4	2.4%	15	4.6%	18	4.7%

Note: *n* = number of articles published in every period.

no doubt, therefore, about the impact and relevance of these two articles in developing the resource-based view of the firm. Related works, such as Penrose (1959), Dierickx and Cool (1989), Lippman and Rumelt (1982), Rumelt (1984), Teece (1982), and Peteraf (1993), are also seen to have exerted significant influence.

- Other examples of works that maintained a high profile over the whole of the sample period are those that introduced key concepts to the discipline, such as Rumelt (1974), who explores the relationship between diversification strategy, corporate structure, and performance; Chandler (1962), who establishes the basis for a better understanding of the corporate development process within the firm, particularly the phenomena surrounding diversification; Miles and Snow (1978), who produced a typology of competitive strategies; and Thompson (1967), who introduces the notions of cooperative and corporate strategies and the formation of alliances. In particular, Rumelt (1974) helped business management to earn its status as a modern, scientifically based discipline. Another prominent set of works are those commonly considered the seminal studies providing the structure upon which the discipline would later be developed: Andrews (1971) and Ansoff (1965).
- A further outcome is the marked influence of a series of works that have proposed different approaches to the study of strategy, some with a more economic focus, such as transaction cost economics (Williamson, 1975, 1985), agency theory (Jensen and Meckling, 1976), and strategic groups (Caves and Porter, 1977); and others more oriented towards organization, such as the evolutionary theory (Nelson and Winter, 1982), the resource-dependence perspective (Pfeffer and Salancik, 1978), organizational behavior theory (Cyert and March, 1963), contingency theory (Lawrence and Lorsch, 1967), and organizational ecology (Hannan and Freeman, 1977, 1984).

Changes in influence

The next stage in the process was to analyze changes in citation percentages in order to reveal gains or losses in influence over the length of the study period and thus obtain a dynamic picture of the transformations that have taken place

within the discipline. Table 2 also shows the percentage of articles from that period that cited each work. The three columns of the table show this total count broken down into the three sub-periods, and Figure 5 records changes in the comparative citation percentages for the different sub-periods considered. The white band shows the percentage gain or loss of influence, from the first sub-period (1980–86) to the second (1987–93), and the shaded band the percentage difference from the second sub-period (1987–93) to the third (1994–2000).

All of the works analyzed in the study fit one of a limited number of patterns (White and McCain, 1998). One of the most common is for documents to increase their influence from the first to the second sub-period and to repeat the process from the second to the third. This, of course, indicates a trend of increasing influence over the entire study period; examples of works exhibiting this pattern are, in order of their percentage gain from the first to the second sub-period: Porter (1985), Nelson and Winter (1982), Williamson (1975), Jensen and Meckling (1976), Prahalad and Hamel (1990), Lippman and Rumelt (1982), Hannan and Freeman (1984), Scherer (1980), Penrose (1959), Teece (1982), Tushman and Anderson (1986), Wernerfelt (1984), Rumelt (1984), Dierickx and Cool (1989), Barney (1986), Rumelt (1991), Cohen and Levinthal (1990), Barney (1991), Child (1972), Pfeffer and Salancik (1978), and Peteraf (1993). By the end of the 1990s, the most outstanding gains within this group were registered by Nelson and Winter (1982), Prahalad and Hamel (1990), Penrose (1959), Wernerfelt (1984), Dierickx and Cool (1989), Barney (1991), Rumelt (1991), Cohen and Levinthal (1990), Barney (1991), and Peteraf (1993). As can be appreciated, all of these works relate to the resource-based view.

Another discernible pattern is that exhibited by works with a rising profile between the first and second sub-periods but declining towards the end of the period as a whole. This may indicate that the work in question reached and passed its maximum weight of influence during the period in question, and appears to suggest that those with the up–up pattern, mentioned earlier, have not yet reached such a point. Works displaying this second pattern are Porter (1980), Williamson (1975), Hambrick and Mason (1984), Mintzberg (1978), Palepu

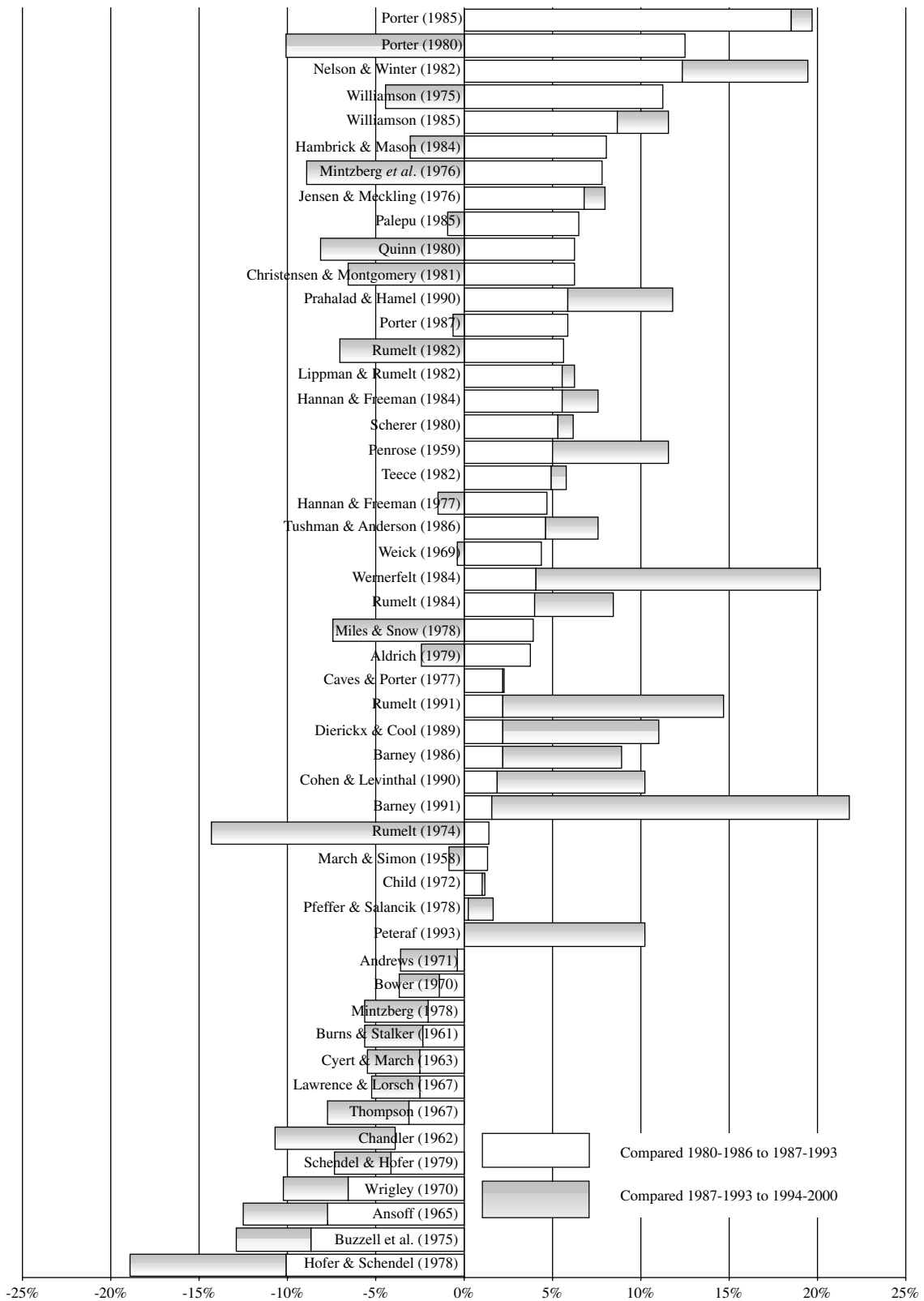


Figure 5. Changes in influence

(1985), Quinn (1980), Christensen and Montgomery (1981), Porter (1987), Rumelt (1982), Hannan and Freeman (1977), Weick (1969), Miles and Snow (1978), Aldrich (1979), Rumelt (1974), and March and Simon (1958).

Theoretically, other possible patterns would be for works to begin by losing influence only to gain it later, though there were no cases of this, and the lose–lose pattern followed by works whose influence declines in both the second and third sub-periods of the 21-year study period. The latter applies to works such as Hofer and Schendel (1978), Buzzell, Gale, and Sultan (1975), Ansoff (1965), Wrigley (1970), Schendel and Hofer (1979), Chandler (1962), Thompson (1967), Lawrence and Lorsch (1967), Cyert and March (1963), Burns and Stalker (1961), Mintzberg (1978), Bower (1970), and Andrews (1971), generally considered to be the founding fathers of the discipline. This trend, taken in combination with the fact that these are some of the most influential works of the whole study period, is even further proof of their extraordinary contribution to the development of the discipline.

Shown below are the results of the co-citation analysis conducted on the most influential works throughout the whole 20-year study period and each of the 7-year sub-periods considered.

The intellectual structure of strategic management research: 1980–2000

In the maps, the size of the points is proportional to the frequency of citation, and documents with similar co-citation profiles tend to show up in clusters. Thus, works that are closely related to others tend to occupy a central position in the ‘intellectual space,’ while those that are only loosely related tend to appear on the periphery. It is, therefore, easy to see whether schools of thought or other intellectual groups are central or peripheral (White and McCain, 1998).

Figure 6 shows the pattern that emerges for the 50 most influential works from 1980 to 2000. The goodness of fit index, $s_{80-00} = 0.090$, can be considered good (see Figure 3).

What appears most striking is the central position occupied by Porter (1980, 1985) and others, such as Scherer (1980), Caves and Porter (1977), Williamson (1975), Rumelt (1974), and Chandler (1962).

The pattern also shows the right-hand side to be taken up by works dealing with the study of diversification strategies and how these relate to performance. Thus, for example, in his doctoral thesis, Wrigley (1970) proposes a typology for diversification and corporate structures that would subsequently be taken up by Rumelt (1974) in his quantitative study of one of the hypotheses postulated by Chandler (1962), which stated that different strategy/structure patterns have different effects on a firm’s performance. Within the same research area, Porter (1987), Palepu (1985), Christensen and Montgomery (1981), and Rumelt (1982) conduct empirical studies designed to reveal the effects of diversification strategies on a firm’s performance.

Alongside these works, and occupying similar positions, are Williamson (1975, 1985) and Jensen and Meckling (1976) on Transaction Cost Theory and Agency Theory, respectively. These key works were written in response to the debate over the origins of the firm and how the limits of this are to be determined, and have practical implications when it comes to analyzing integration, externalization, diversification, and internationalization strategies. Thus Organizational Economics has been a useful aid to analyzing these kinds of issue (Hoskisson *et al.*, 1999).

In the top left-hand area of the graph there is a dense cluster formed by a series of works relating to the resource-based view of the firm. This series features not only the works of Penrose (1959) and Wernerfelt (1984) but also important contributions such as Teece (1982), Barney (1986, 1991), Dierickx and Cool (1989), Prahalad and Hamel (1990), Peteraf (1993), Lippman and Rumelt (1982), Rumelt (1984, 1991), and Cohen and Levinthal (1990). Occupying a prominent position alongside these is the seminal work by Nelson and Winter (1982) on the evolutionary approach to the firm. Its presence alongside a set of works dealing with resources and capabilities may be explained bearing in mind that both of these approaches converge once organizations are defined as a specific set of attributes and resources, referred to in evolutionary theory as corporate routines and in the resource-based view as competencies or capabilities.

The left-hand side of the graph features works that attribute a decisive role to environmental conditions in exploring the factors involved in the long-term success or survival of the firm.

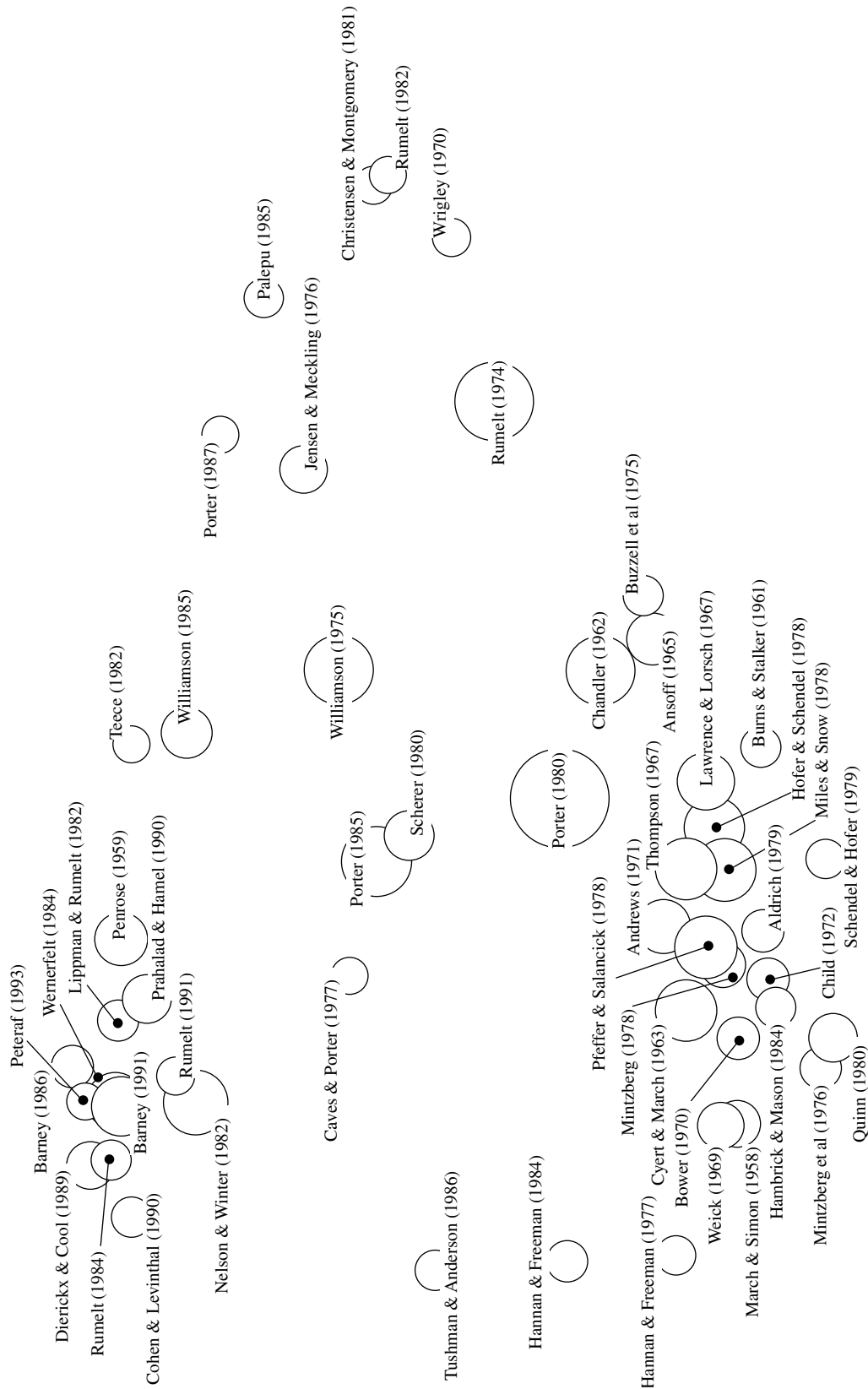


Figure 6. Intellectual structure of strategic management research: 1980–2000 ($s = 0.0971$)

These authors see firms as operating in a competitive world that might be described as Darwinist, since it is environmental factors that decide which firms will succeed or survive and which will fail. Thus, Hannan and Freeman (1977) provide the basis for population ecology theory, while Hannan and Freeman (1984) develop the structural inertia model, which establishes that firms incur great risks in trying to adapt to their environment, and therefore that the survivors will be the ones that include inertia in their strategy and structure, because this makes them more reliable. Another work that emerges in relation to these is Tushman and Anderson (1986), which explores patterns of technological change and the impact of major technological breakthroughs on environmental conditions (uncertainty, munificence and corporate growth rate).

The lower area of the graph is taken up by works such as Chandler (1962), Ansoff (1965), and Andrews (1971) where, as Rumelt, Schendel, and Teece (1994) report, the basic elements of the field of strategic management are to be found: they help to define various concepts and proposals, such as how strategy affects performance, the importance of external opportunities and internal competencies, the notion of strategy-based structure, the practical differences between formulation and implementation, and the active role of the members of the management team in strategic management.

Another work that occupies a central position on the graph is Thompson (1967). In their review of the field of strategic management, Hoskisson *et al.* (1999) actually condemn Rumelt *et al.* (1994) for their failure to take this contribution into consideration and acclaim Thompson (1967) as the first to introduce the notions of competitive and cooperative strategies and the formation of alliances, the forerunners of strategic networks and alliances. Their work also helped to provide better understanding of the implications of corporate strategy by introducing the notion of divisional interdependence.

Contemporary with the works just mentioned is that of Buzzell *et al.* (1975) published in the *Harvard Business Review*. This article reported on the close correlation between market share and profitability that had emerged from a statistical survey of a large sample of firms (PIMS Programme).

Other influential works to be found in the lower area of the graph are, for example, Cyert and March (1963), which retrieves the idea of the firm

as a collective of groups with different and varying interests, able to adapt to the uncertainties of their environment by following the principles of satisficing behavior in problem solving (Cuervo and Fernández, 1999); and Pfeffer and Salancik (1978), which highlights the importance of the power struggle/power-sharing in the environment and therefore of mutual dependence between organizations, thus developing what has come to be known as the resource-dependence theory.

Another two high-profile titles are those of Mintzberg (1978) and Miles and Snow (1978). These authors make two significant contributions to the area of corporate patterns: the former introduced the idea of structural patterns, while Miles and Snow are responsible for the notions of defensive, prospective, analytical, and reactive strategic patterns.

This cluster of works situated in the lower area of the graph reveals the overall predominance of the influence of Organizational Theory, which has an articulating effect on the study of strategy and leads to a change of outlook that proposes strategy as a mode of action, more process- than content-oriented and concerned with distinguishing deliberate action from spontaneous action and learning. The majority of these authors see the firm primarily as an organization made up of numerous individuals interacting with one another. They are critical, therefore, of the literature emerging from the field of economics, industrial organization and the resource-based view of the firm, where strategy is viewed as a single rational mind deciding the firm's future on an individual basis (Cuervo and Fernández, 1999).

Figure 6 reveals the contributions that have grown from the three roots of strategic management (Baum and Rao, 1998): (1) *economics*, which takes up the central, top and right hand areas of the graph, and represents the contributions made by microeconomics with transaction cost theory (Williamson, 1975, 1985), agency theory (Jensen and Meckling, 1976), evolutionary economics (Nelson and Winter, 1982) and the resource-based view of the firm (Wernerfelt, 1984; Barney, 1991), and the contribution of industrial economics, with the structure-conduct-performance paradigm (Porter, 1980; Scherer, 1980) and the study of strategic groups (Caves and Porter, 1977); (2) *sociology*, found in the lower areas of the graph, with contributions from contingency

theory (Lawrence and Lorsch, 1967), resource-dependence theory (Pfeffer and Salancik, 1978), and organizational ecology (Hannan and Freeman, 1977, 1984); and (3) *psychology*, also in the lower part of the graph, with contributions such as Cyert and March (1963), Mintzberg (1978), and Quinn (1980).

Changes in the intellectual structure of strategic management

In order to observe changes in relationships, we mapped the sub-periods using the 20 works most frequently cited in the articles published in each period. Table 3 summarizes the references used in the mapping process.

A number of important observations can be made from a preliminary analysis of these data. References that appear in italics refer to works included among the top 20 in each of the sub-periods considered. Some authors, such as White and McCain (1998), go so far as to refer to them as the 'canonical literature.' They include: Porter (1980), Rumelt (1974), Chandler (1962), Cyert and March (1963), Pfeffer and Salancik (1978), and Williamson (1975).

As we turn from the first to the second period, however, several works disappear from among the 20 most influential; some examples are Buzzell *et al.* (1975), Wrigley (1970), Schoeffler, Buzzell, and Heany (1974), Schendel and Hofer (1979), Mintzberg, Raisinhanani, and Theoret (1976), Burns and Stalker (1961), Bower (1970), and Ackoff (1970); while others, such as Porter (1985), Nelson and Winter (1982), Quinn (1980), Mintzberg (1978), Williamson (1985), Christensen and Montgomery (1981), Rumelt (1982), and Scherer (1980), enter to form part of the group.

By the time of the second transition, that is, towards the latter half of the 1990s, works falling from the top 20 are, for example, Miles and Snow (1978), Hofer and Schendel (1978), Thompson (1967), Quinn (1980), Mintzberg (1978), Lawrence and Lorsch (1967), Andrews (1971), Ansoff (1965), Christensen and Montgomery (1981), and Rumelt (1982); these foremost positions are taken up meanwhile by works such as Barney (1991), Wernerfelt (1984), Dierickx and Cool (1989), Penrose (1959), Prahalad and Hamel (1990), Barney (1986), Peteraf (1993), Cohen and Levinthal (1990), Jensen and Meckling (1976), and Rumelt (1991).

The intellectual structure of strategic management research in the early 1980s

Figure 7 shows the configuration of the 20 works most frequently cited in the articles published in the *SMJ* from 1980 to 1986, a period when the discipline was still considered to be in its developing stage. The pattern reveals the fundamental role of the works of Chandler (1962), Ansoff (1965), Lawrence and Lorsch (1967), Miles and Snow (1978), Hofer and Schendel (1978), Andrews (1971), Cyert and March (1963), and Thompson (1967), who introduced what would prove to be the key concepts and ideas of the discipline as it was to develop.

Together with the group just mentioned, two works appeared that played a decisive role in the subsequent development of strategic management research: (1) Porter (1980), where the five competitive forces model was first introduced, is the work with the highest citation frequency of the period; considering the year of publication of this work, this is an eloquent indication of its impact and dissemination among the academic community; and (2), the work of Rumelt (1974), who used quantitative techniques on a sizeable sample to examine how strategy type and corporate structure relate to performance. Hoskisson *et al.* (1999) describe this work as having paved the way for the use of quantitative methodology in subsequent studies within the discipline.

Intellectual structure in the period leading up to the 1990s (Figure 8)

This map shows how the central position in the intellectual structure was held by two works of Porter (1980, 1985), where such key concepts of the discipline as the five competitive forces model and the value chain were first introduced. Chandler (1962), in which the concepts of strategy and structure were presented, retained its central position at the forefront.

The lower part of the map continues to be occupied by Cyert and March (1963), Andrews (1971), Mintzberg (1978), and Quinn (1980), who place the emphasis on decision-making as central to the role of management. Positioned more towards the periphery, and therefore in a complementary capacity, we find the works of Williamson (1975, 1985) on transaction cost economics and Nelson and Winter (1982) who develop the evolutionary theory. Another important group is formed by

Table 3. The 20 documents selected for mapping in every subperiod

C	1980–86 (n = 165)		1987–93 (n = 324)		1994–2000 (n = 381)			
	c	Cited reference	c	Cited reference	c	Cited reference		
41	24.4%	Porter (1980)	121	37.5%	Porter (1980)	104	27.3%	Porter (1980)
40	24.2%	Rumelt (1974)	83	25.6%	Rumelt (1974)	83	21.8%	Barney (1991)
39	23.6%	Hofer and Schendel (1978)	62	19.1%	Williamson (1975)	79	20.7%	Wernerfelt (1984)
35	21.2%	Chandler (1962)	60	18.5%	Porter (1985)	75	19.7%	Porter (1985)
28	17.0%	Ansoff (1965)	56	17.3%	Chandler (1962)	74	19.4%	Nelson & Winter (1982)
27	16.4%	Thompson (1967)	52	16.0%	Miles and Snow (1978)	56	14.7%	Dierickx and Cool (1989)
25	15.2%	Cyert and March (1963)	44	13.6%	Hofer and Schendel (1978)	56	14.7%	Williamson (1975)
23	13.9%	Buzzell et al. (1975)	43	13.3%	Thompson (1967)	51	13.4%	Penrose (1959)
22	13.3%	Lawrence and Lorsch (1967)	41	12.7%	Cyert and March (1963)	50	13.1%	Pfeffer and Salancik (1978)
20	12.1%	Miles and Snow (1978)	40	12.3%	Nelson and Winter (1982)	45	11.8%	Prahalad and Hamel (1990)
19	11.5%	Wrigley (1970)	40	12.3%	Quinn (1980)	44	11.5%	Williamson (1985)
19	11.5%	Pfeffer and Salancik (1978)	39	12.0%	Mintzberg (1978)	43	11.3%	Rumelt (1974)
18	10.9%	Andrews (1971)	38	11.7%	Pfeffer and Salancik (1978)	42	11.0%	Barney (1986)
17	10.3%	Schoeffler et al. (1974)	35	10.8%	Lawrence and Lorsch (1967)	40	10.5%	Chandler (1962)
16	9.7%	Shendel and Hofer (1979)	34	10.5%	Andrews (1971)	39	10.2%	Peteraf (1993)
14	8.5%	Mintzberg et al. (1976)	30	9.3%	Ansoff (1965)	39	10.2%	Cohen and Levinthal (1990)
14	8.5%	Burns and Stalker (1961)	28	8.6%	Williamson (1985)	37	9.7%	Cyert and March (1963)
13	7.9%	Williamson (1975)	28	8.6%	Christensen and Montgomery (1981)	35	9.2%	Scherer (1980)
13	7.9%	Bower (1970)	28	8.6%	Rumelt (1982)	35	9.2%	Jensen and Meckling (1976)
12	7.3%	Ackoff (1970)	27	8.3%	Scherer (1980)	34	8.9%	Rumelt (1991)

N, articles published; C, absolute frequency; c, relative frequency.

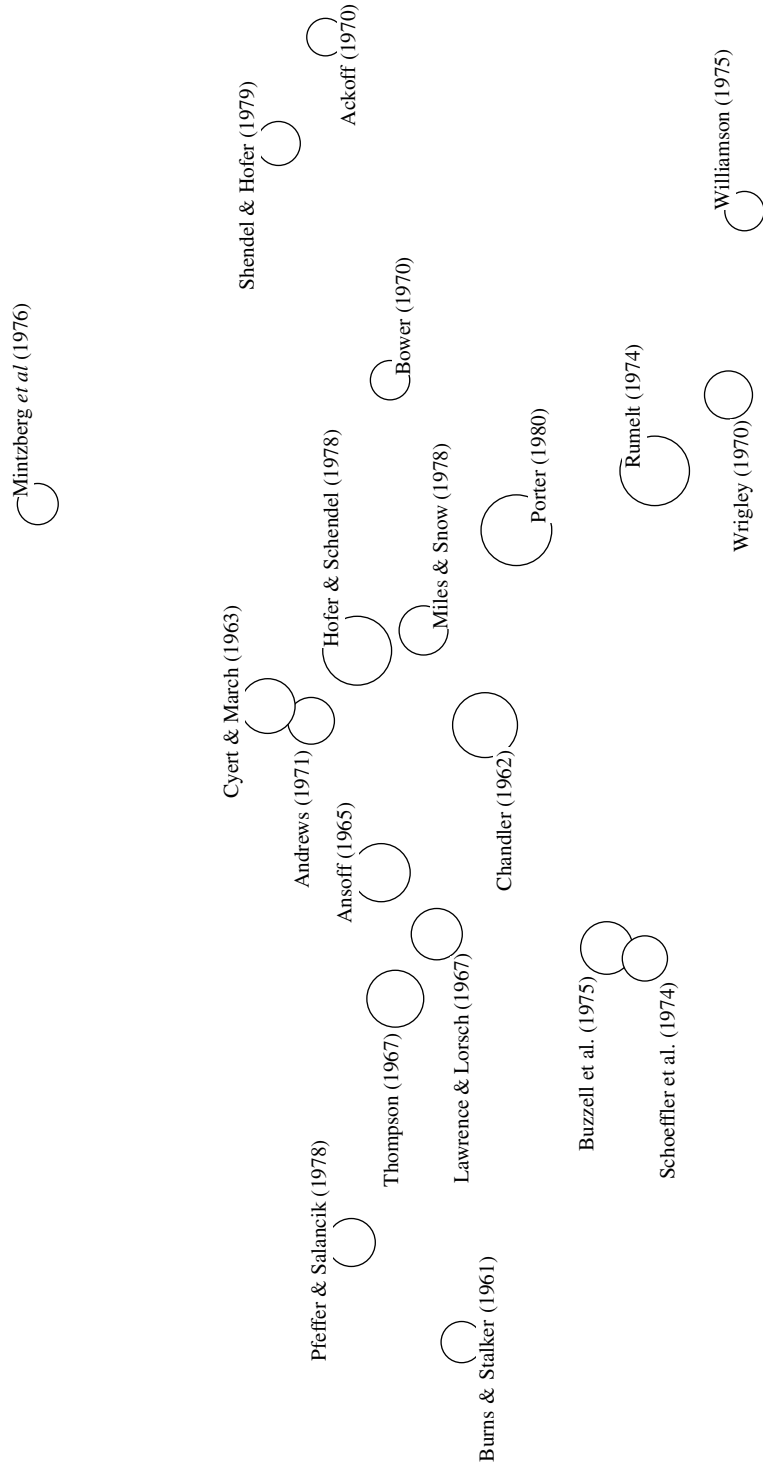


Figure 7. Intellectual structure of strategic management research: 1980–86 ($s = 0.0982$)

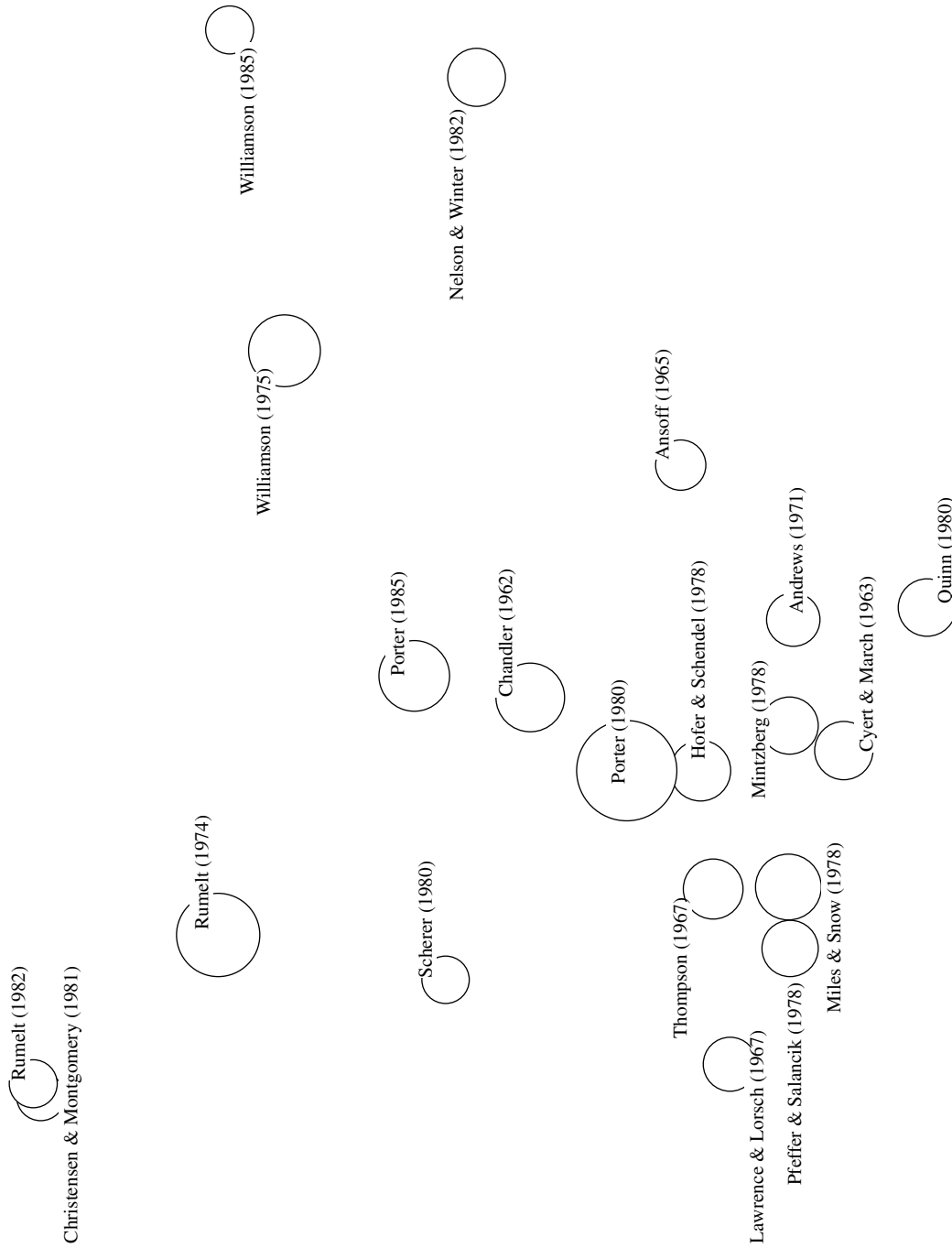


Figure 8. Intellectual structure of strategic management research: 1987–93 ($s = 0.0902$)

Thompson (1967), Lawrence and Lorsch (1967), Miles and Snow (1978), and Pfeffer and Salancik (1978), which all feature the importance of environment on strategy.

Finally, the top part of the graph is occupied by Rumelt (1974), Christensen and Montgomery (1981), and Rumelt (1982). All of these contributed empirical studies aimed at exploring the relationship between diversification strategy and performance. Christensen and Montgomery (1981), in particular, updates the sample of 128 firms taken by Rumelt (1974) and uses it to explore the economic performance of the firm in relation to two variables: diversification strategy and market structure. Finally, by updating and adding to the information contained in his previous study, Rumelt (1982) demonstrates that the diversification strategy–performance relationship continues even after the effects of variations in profitability within the sector have disappeared, thus revealing the further possibility of distinguishing between sector-related effects on performance and those derived from a diversification strategy.

Intellectual structure towards the end of the 1990s: the resource-based view

As in the preceding maps, a feature of Figure 9 is the central position held by the works of Porter (1980, 1985) and Williamson (1975, 1985), but this graph also clearly shows a set of works that have developed the resource-based view of strategy. Clustered around the influential work of Wernerfelt (1984) we find studies that provided the basis for this approach, Penrose (1959), Nelson and Winter (1982) and later works in which different aspects of this view were developed, such as Barney (1986, 1991), Prahalad and Hamel (1990), Peteraf (1993) and Dierickx and Cool (1989).

CONCLUSIONS

The intellectual basis upon which a discipline develops is largely revealed in the citations that researchers make in their writings. The citations included in the articles published over a given period of time and in a given area of research make up what is known as the literature in active circulation (Saéz *et al.*, 1999). This is the term used to refer to the literature containing the live data in use at a particular time and reveals the

intellectual structure from which the discipline is evolving. A study of the references that appear in strategic management research articles is a key to exploring and understanding the origins of scientific data accepted and utilized by the community of specialists in the discipline.

Though numerous studies have described the state and evolution of strategic management and have identified different schools of thought, there are no bibliometric studies that attempt to quantify and address the intellectual structure of research in this field. This paper, therefore, identifies the most influential published sources and explores the changes that have come about in the intellectual structure of strategic management research using the bibliographic references cited by a significant group of authors active in the discipline. This analysis is conducted under the bibliometric hypothesis that these references will be a reliable indication of the influence of certain sources of data in the works of these authors.

The findings presented and discussed in the previous section lead to the following conclusions:

- The compilation of citations appearing in articles published in the *SMJ* from its first issue up to and including December 2000 reveals works written in book form as exerting the strongest influence: of the 20 most frequently cited works, 18 are books and two are articles published in journals. This is a tendency that appears to be changing, judging from the citation tables for more recent periods: these reveal a growing use of articles from journals.
- Other exploratory studies of the field closely coincide in naming works by Chandler (1962), Ansoff (1965), and Andrews (1971) as the writings constituting the basis of the discipline. While this view is supported by the findings of the present study, evidence also emerges of the importance and influence of other contemporary works that have contributed to its formation from other perspectives, such as Penrose (1959), Cyert and March (1963), Thompson (1967), Lawrence and Lorsch (1967), and Rumelt (1974).
- Analysis of the changes in the intellectual basis underlying this discipline reveals a relative reduction in the number of citations of the above-mentioned works, which are looked upon as classics. This indication of their declining recognition in print could be interpreted as a

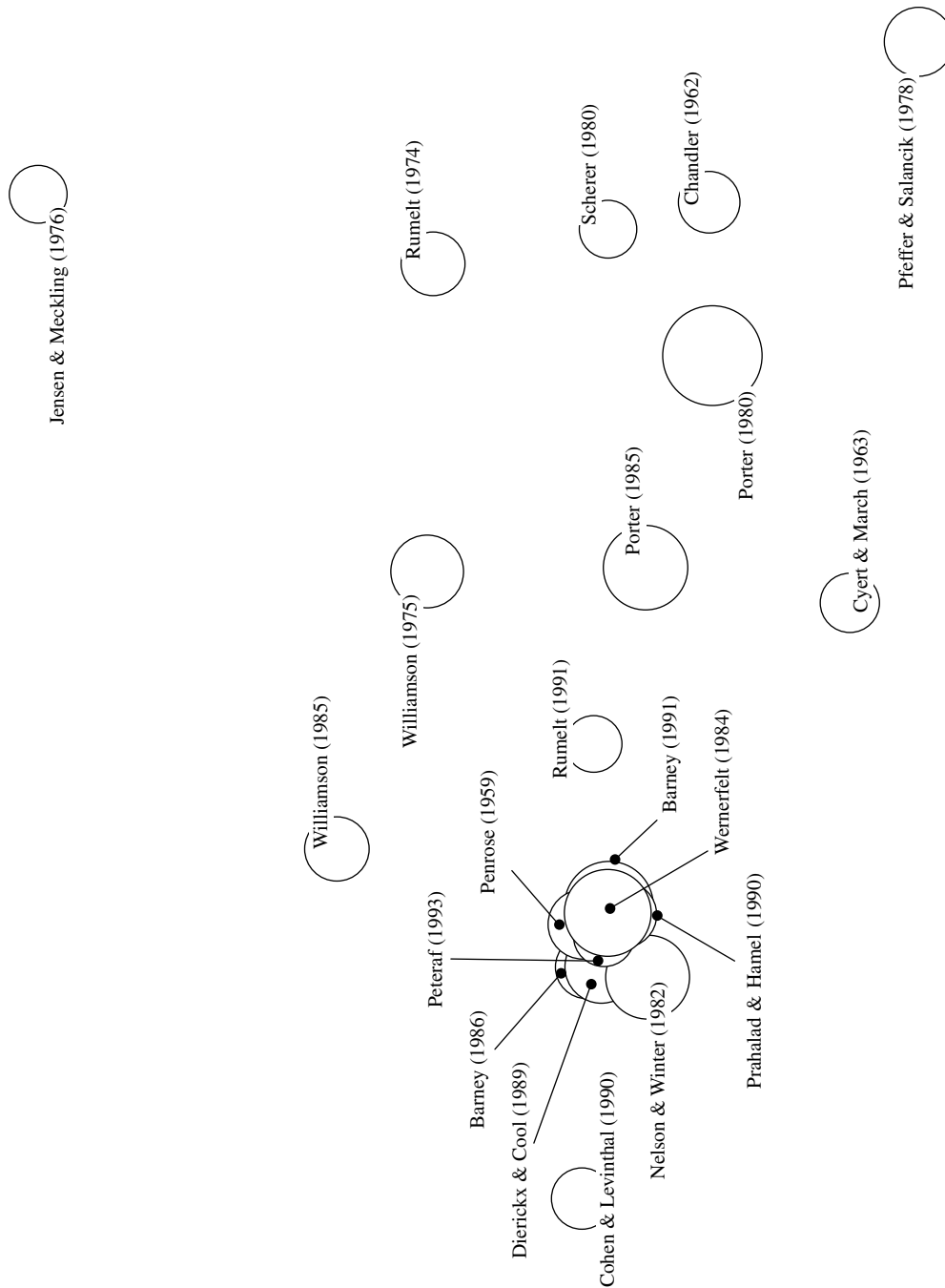


Figure 9. Intellectual structure of strategic management research: 1994–2000 ($s = 0.0933$)

sign of the universal acceptance and integration of the concepts they introduced and thereby of their contribution to the coming of age of this discipline.

- Porter's works (1980, 1985) confirm him as the author with the most influence in the development of the discipline, in spite of the fact that our analysis of the dynamics of citation reveals that his five competitive forces model, together with the positioning-based view of strategy, in other words, the structure–conduct–performance paradigm associated with industrial organization, has now been supplanted.
- Recently, the most important contribution to the discipline proves to be the resource-based view of the firm. Despite the fact that this view dates back to the time of the publication of the article by Wernerfelt (1984), i.e. only 4 years after Porter (1980), it was not until well into the 1990s that it actually secured wide recognition among researchers in the field. This renewed interest may have been the result of the boost it received from Barney (1991) and by the fact that in 1994, 10 years after it had first appeared, Wernerfelt's article was awarded the *SMJ*'s first Best Paper Prize.

This study inevitably has its limitations, some resulting from the research design and others as a direct consequence of the bibliometric techniques that were employed. Among the main drawbacks with the research design were the selection of a single journal and the division of the study period into three sub-periods. By selecting one journal only and thereby conditioning the time period to be studied, we inevitably place a limit on the potential scope of our results, since the documents that were analyzed were a mere fraction of all strategic management research works. It is possible that significant changes in these rankings could appear if strategic management articles from a wider range of journals were included. However, we are reasonably confident that the literature analyzed here represents the major research efforts made in this discipline. The fact that the study period was divided into three equal sub-periods conditioned the evolution that was identified, but no more so than if any other number of subdivisions had been made. Therefore, given that the purpose of this study was not to identify the real periods of development of the discipline, an effort has been made to interpret the results

in broad, generic terms, to bear in mind that the boundaries separating the different periods are inevitably blurred and to resist the temptation to draw a time limit around the period of influence of any particular approach during the course of the development of this area of research.

Moreover, this study is also subject to the limitations that are inherent in bibliometric techniques. Thus, for example, when compiling citations, it is impossible to distinguish the motives for which they were made: whether the author's intention was to refer to previous works and build up a theoretical framework, or to criticize the document, display the author's knowledge, adorn the text or, simply, to mention one of his/her own works. In contrast to this, missing references to certain works may be a result of obliteration, in other words, the omission of references to works that have become taken for granted to such a degree by the scientific community that they are no longer expressly cited, or, worse still, are for some obscure reason deliberately omitted. These limitations are compensated to some degree by the strict review process to which the journal in question subjects articles before their publication.

Furthermore, since the citations used for the purposes of this study are taken from a given period, works published towards the end of this period have not been exposed to the scientific community for as long as those published earlier and are therefore less likely to have been cited. This is an undeniable fact but, since we consider the number of citations not so much as a sign of quality but rather of influence, we feel it fair to acknowledge the fact that more recent works may not have had sufficient time to influence the literature in this discipline.

Co-citation analysis also has its drawbacks. This technique permits the classification of only a very small fraction of the documents cited and interpretation of the resulting maps is inevitably subjective. However, though some documents are omitted, the clusters that emerge indirectly reveal the existence of a group of researchers who share the same interests and coincide in citing the same references (Callon *et al.*, 1993).

Some of the limitations we have mentioned have no solution; these, however, are not exclusive to bibliometrics but are present in any non-experimental discipline and in management in particular. Others, however, can be addressed and

should provide the incentive to improve the techniques used in this study. In this respect, we intend, in future research, to enlarge the sample to include other journals and thereby extend the study period and increase the number of documents featured on the maps; we want to enhance the interpretation of the maps in particular by applying social network analysis, in order to identify clusters and measure their density and centrality within the network of co-citations within which they are embedded.

In any event, this study demonstrates the use of a tool that has great potential for use in management research. This type of analysis is possible in a wide range of topics, especially newly developed areas such as the knowledge-based perspective of the firm and strategic networks, where bibliometric studies have not yet been conducted.

It could also usefully be applied to other forms of scientific and technical writing, such as congress proceedings, doctoral theses and, in particular, patents. In this last area there are some recent studies that use bibliometrics to analyze patent files in order to assess intangible assets and to explore knowledge-related issues, in journals of recognized prestige. Examples of this type of study are Almeida (1996), Stuart and Podolny (1996), Mowery, Oxley, and Silverman (1996), Coulter, Monarch, and Konda (1998), DeCarolis and Deeds (1999), Noyons, Moed, and Luwel (1999), McMillan and Hamilton (2000), Frost (2001), and Rosenkopf and Nerkar (2001).

To sum up, studies such as this provide a quantitative analysis of the state of the art as a complement to, but never a substitute for, traditional qualitative methods of reviewing the literature. They can be used as a tool to identify the authors, documents, and journals most widely read among the researchers in a given discipline and also to detect relational links between them. The researcher can therefore use these methods to identify the relevant literature in any area of research, map its intellectual structure, and thus obtain a view of the field reflected in the behavior of its actors themselves.

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