國 立 交 通 大 學

資訊管理研究所

碩 士 論 文

使用共引用分析法進行企業與資訊系統策略校準之實證分析

Business and IS Strategic Alignment Using Co-citation Method: an Empirical Analysis

研 究 生： 陳建良

指導教授： 楊 千 博士

中 華 民 國 九 十 六 年 六 月

使用共引用分析法進行企業與資訊系統策略校準之實證分析

Business and IS Strategic Alignment Using Co-citation Method: an Empirical Analysis

研 究 生： 陳建良　　　　　　　　Student: Chien-Liang Chen

指導教授： 楊　千　　　　　　　　Advisor: Chyan Yang

國立交通大學

資訊管理研究所

碩士論文

A Thesis
Submitted to Institute of Information Management
College of Management
National Chiao Tung University
in Partial Fulfillment of the Requirements
for the Degree of
Master of Science
in
Information Management

June 2007

Hsinchu, Taiwan, the Republic of China

中 華 民 國　　九十六　　年　　六　　月

使用共引用分析法進行企業與資訊系統策略校準之實證分析

學生：陳建良　　　　　　　　　　　　　　　指導教授：楊 千 博士

交通大學 資訊管理研究所 碩士班

中文摘要

資訊科技在過去企業競爭變革的歷史中扮演著非常重要的角色。回顧過去成功的資訊科技發展，我們可以發現在上面大多的投資多屬於商業導向而非技術導向。而在過去數十年中，大量策略規劃與策略調準相關文獻被不斷地發表在各種管理期刊中。從70年代至今，各種策略調準理論與應用不斷地發展。然而，我們沒有一個有系統的方法來分析發展趨勢與文獻之間的關係，用以協助人們能夠更了解策略調準的趨勢並且快速的找出經典文獻。

這份研究將尋求在以下目的有所貢獻。首先，我們將試著了解策略調準的主要趨勢。而為了使這份研究客觀並且具有實證性，我們使用了共引用分析法做為主要研究方法。第二，我們將討論策略調準相關文獻，並試著找出他們之間的關係，在最後能夠找出其中經典或具有重大影響的文獻。

因素分析結果將顯示四個因素作為企業與資訊系統策略調準的主要趨勢與其中的相關文獻。

關鍵字：企業與資訊系統校準、共引用分析法、因素分析、多維尺度分析法

Business and IS Strategic Alignment Using Co-citation Method: an Empirical Analysis

Student: Chien-Liang Chen   Advisor: Dr. Chyan Yang

Institute of Information Management

National Chiao Tung University

Abstract

IT has played an important role in the recent history of enterprises competition evolution. A review of successful IT initiatives shows that IT investments are business-driven rather than technology-driven. Since the 1970s, many papers on strategic planning and alignment related topics have been published in management journals, and different types of strategic alignment theories and applications have been developed. However, there is no systematic way to analyze the trends and relationships among these papers to help people realize the trend of strategic alignment and locate relevant papers efficiently.

This thesis seeks to fulfill two objectives. First, we try to realize the main trends of strategic alignment. To make an objective and empirical study, we apply the co-citation method as the main research method. Second, we discuss strategic alignment related papers, try to identify the relationships among them, and recommend classic or highly influential papers in the field.

The results of factor analysis identify four factors as the main trends and we can identify the related documents of them.

Keywords: Business and IS Strategic Alignment, Co-citation, Factor Analysis, Multidimensional Scaling (MDS) Analysis

誌　謝

Contents

List of Tables

List of Figures

1. Introduction

1.1. Research Background

In this era of global competition and low profit market, the trend toward globalization and virtualization of the business environment continues to spread leading to tremendous changes that affect enterprises both internally and externally. Increased competition arising from the global markets has had a major impact on every organization and enterprise. If enterprises hope to keep their competitiveness, they need to become more innovative, efficiently production, and quickly response to compete in the market by offering customers cheaper and better products. To anticipate and respond the changes in the business environment quickly, organizations and enterprises are deploying information technology (IT) at an increasing rate (Earl, 1989).

IT has played an important role in the recent history of enterprises competition evolution. Applications include Management Information Systems, Electronic Data Interchange Systems, Decision Support Systems, Computer Integrated Manufacturing, Executive Information Systems, and Enterprise Resource Planning. A review of successful IT initiatives shows that such investments are primarily business-driven, rather than technology-driven. Thus, executives feel that better integration of their technology planning and business planning processes is important (Henderson and Venkatraman, 1991). Researchers adopt a contingency theory perspective and surmised that IT would influence business performance to the extent that it would be in ''alignment'' or ''fit'' with the strategic, structural, and environmental dynamics specific to each organization (Chan, Huff, Barclay, and Copeland, 1997; Henderson, 1990; Henderson and Venkatraman, 1992; Earl, 1989; Sabherwal and Chan, 2001).

Since the 1970s, many papers on strategic planning and alignment related topics have been published in management journals, and different types of strategic alignment theories and

applications have been developed; for example, Miles and Snow's typology of Defenders, Analyzers, and Prospectors (Miles and Snow, 1978), and Henderson and Venkatraman's Strategic Alignment Model (Henderson and Venkatraman, 1991). An empirical study of Miles and Snow's typology was made by Sabherwal and Chan (2001); Baets (1996) focused on strategic alignment on banking. However, there is still no systematic way to analyze the trends and the relationships among papers to help people realize the trends of strategic alignment and find the classical papers easily.

1.2. Research Purpose

This thesis seeks to fulfill two objectives. First, we try to realize the main trends in strategic alignment. To make an objective and empirical study, we apply the co-citation method as the main research method. The co-citation method is a bibliometrical method that is widely used to study the structure of scientific disciplines and trends. Factor Analysis and Multidimensional Scaling Analysis are also used to help separate every sub-area in the topic. The co-citation method is discussed in Chapter Two.

Second, we discuss strategic alignment related papers, try to identify the relationships among them, identify every sub-area, and recommend classic or highly influential papers in the field. It is hoped that this work will help researchers better understand strategic alignment issues and develop new theories and applications.

1.3. Research Process

The research process comprises five steps:

1. Choose the topic: We selected business and IS strategic alignment as our topic.

2. Paper collection: Collect as many business and IS strategic alignment related papers as possible.

3. Select core papers: The more core papers we have, the more precise our conclusions about trends in strategic alignment will be. To avoid having too many papers as well as papers with only a few citations, we set only select papers that fit a topic well and have enough citations for analysis. If we do not have enough papers for a particular topic, we return to step 2 to collect more papers.

4. Statistic analysis: In this step, Factor Analysis and Multidimensional Scaling Analysis are used to analyze the sub-areas of strategic alignment and separate them into several clusters.

5. Discussion and conclusion: According to the results of statistical analysis, we discuss the relationship between these papers and draw some conclusions.

The remainder of the thesis is organized as follows. In the next section, we present a brief literature review, introduce the co-citation method, and explain how we use it to analyze business and IS strategic alignment. The third section details the results of our statistical analysis. Then, in the last section, we make some concluding remarks and consider future research avenues.
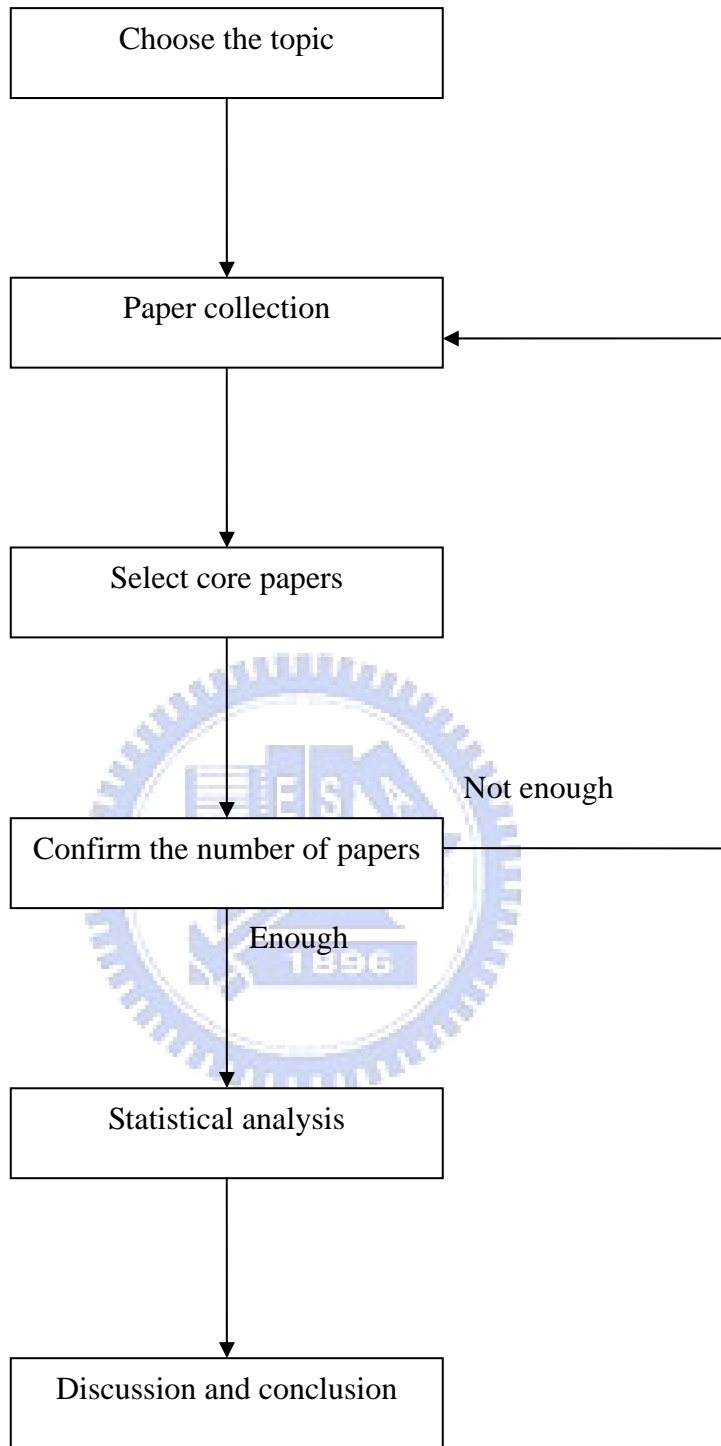
Figure 1 Research Process

2. Literature Review

2.1. Business Strategy

The Strategic Typology

Adaptive cycle, a general model of the adaptive process developed by Miles and Snow, is consistent with the strategic-choice approach to the study of organizations, and parallels and expands ideas formulated by theorists. According to adaptive cycle, Miles and Snow defines three strategic types of organization, *Defenders, Analyzers, and Prospectors*, to explain how organizations move through the adaptive cycle and the solutions they employ to solve entrepreneurial, engineering and administrative problems. A fourth type of organization in their studies is called the *Reactor*, which is a form of strategic "failure" (Miles and Snow 1978).

1. Defenders:

    i. Entrepreneurial problem: To solve the entrepreneurial problem, Defenders pursue stability by sealing off a portion of the total market. They only produce a limited set of products at a narrow segment of the total potential market, and prevent competitors from entering this limited domain.

    ii. Engineering problem: Defenders ignore developments and trends outside of their domains and grow through market penetration and some limited product development. Because they choose a narrow product domain, Defenders invest in their engineering problem which is the efficiency in the production and distribution.

    iii. Administrative problem: The solution to their administrative problem is closely aligned with the solutions to the entrepreneurial and engineering problems. To achieve strict control of the organization in order to ensure efficiency, they use the combination of structural and process mechanisms, described as "mechanistic" (Burns, Tom and Stalker,

1961).

iv. Risk: The risk to Defenders is ineffectiveness because they are unable to respond to major changes in the environment.

2. Analyzers:

i. Analyzers' organization is between the two side of defender and prospector. They are a unique combination of the defender and prospector types.

ii. Entrepreneurial problem: Analyzers not only maintain a firm base of traditional products and customers, they also develop new products and exploit market opportunities. They focus on hybrid domain that is both stable and changing and hope to grow through market penetration and product-market development.

iii. Engineering problem: Investing in dual technological core and highly influential applied engineering group. They moderate the degree of technical rationality.

iv. Administrative problem: The problem involves differentiating between the organization's structure and processes to accommodate both stable and dynamic areas of operation. Analyzers typically solve this problem with a matrix organizational structure.

v. Risk: The analyzer's twin characteristics of stability and flexibility limit the organization's ability to change dramatically. Therefore, the primary risks are inefficiency and ineffectiveness if Analyzers do not maintain the necessary balance in their strategy-structure relationship.

3. Prospectors:

i. Entrepreneurial problem: Prospectors want to locate and exploit new products and market opportunities. They focus on a broad and continuously developing domain, monitor a wide range of environment conditions, and create changes in their respective industries. They grow through product and market development.

ii. Engineering problem: To avoid a long-term commitment to a single technological process, Prospectors invest resources in multiple technologies and use flexible, prototypical technologies.

iii. Administrative problem: Prospectors' administrative systems must be able to deploy and coordinate resources among numerous decentralized units, rather than plan and control the operations of the entire organization centrally. Their structure-process mechanisms must be "organic" (Burns, Tom and G.M. Stalker, 1961).

iv. Risk: This type of organization runs the primary risk of low profitability and over extension of resources.

4. Reactor: A reactor exhibits a pattern of adjustment to its environment that is both inconsistent and unstable. This type lacks a set of response mechanisms it can put into effect when faced with changes in the environment. As a result, reactors exist in a state of almost perpetual instability.

Business Strategy Profiles of Defenders, Analyzers, and Prospectors

Venkatraman's STROBE measure of operationalization has been widely used to evaluate business strategies (e.g., Chan et al., 1997; Croteau and Bergeron, 1999; gilbert, 1995). Sabherwal and Chan developed ideal business strategy profiles for three configurations by drawing upon a variety of previous research works that focus on one or more of six business strategy attributes, Defensiveness, Risk Aversion, Aggressiveness, Proactiveness, Analysis and Futurity. They used the metrics developed by Segev (1989) and Doty et al. (1993) after converting them from continuous, seven- or eight-point scales, to three-point scales of high, medium and low (Sabherwal and Chan, 2001).

Table 1 Business Strategy Profiles of Defenders, Prospectors, and Analyzers

Business Strategy Attributes	Defenders	Prospectors	Analyzers
Defensiveness	High	Low	Medium
Risk Aversion	High	Low	High
Aggressiveness	Medium	High	Medium
Proactiveness	Low	High	Medium
Analysis	Medium	Medium	High
Futurity	High	Medium	Medium

Source: Sabherwal and Chan, 2001

Empirical Studies

Bergeron, Raymond and Rivard proposed and empirically validated an operational model of strategic alignment based on a gestalt perspective of fit and theory-based ideal coalignment patterns. They found that low performance firms exhibited a conflictual coalignment pattern of business strategy, business structure, IT strategy, and IT structure that distinguished them from other firms (Bergeron, Raymond and Rivard, 2004). Crotean and Bergeron analyzed data provided by top managers from 223 organizations using a Partial Least Squares tool. Using Miles and Snow's typology to characterize business strategies, they found that an outward technological profile contributes directly to the organizational performance of Analyzer strategic activities; while an inward profile of technological deployment contributes indirectly to the organizational performance of Prospector strategic activities (Crotean and Bergeron, 2001).

2.2. IS Strategy

McFarlan and Mckenney developed the Strategic Grid, a 2 x 2 matrix that illustrates the strategic impact of IS under development vs. the strategic impact of existing application systems, to locate the position of an enterprise in the information systems strategy (McFarlan and Mckenney, 1983). Four categories of the Strategic Grid are described as follow:

1. Support strategy: low on both dimensions; an enterprise located in this position uses the IS to support easy jobs or unimportant operations. They do not have any development plans.

2. Factory strategy: high existing and low developing; they rely on IS in the routine and important operation heavily. However, they care more about maintaining current IS than developing new applications.

3. Turnaround strategy: low existing and high developing; they use IS for easy jobs or unimportant operations, but they propose giving IS an important role in the future.

4. Strategic strategy: high on both dimensions; IS plays an important role in daily operations. Current systems are being improved and new applications are being developed for future competition.

Table 2 Strategic Grid

		Strategic impact of the future portfolio of information systems	
		Low	High
Strategic impact of the existing portfolio of information systems	**Low**	Support strategy	Turnaround strategy
	High	Factory strategy	Strategic strategy

Source: McFarlan and Mckenney, 1983

The ideal profiles of IS strategy attributes for Defenders, Prospectors, and Analyzers developed by Sabherwal and Chan are shown in Table 3. Operational support systems use IS to monitor and control daily operations. Market information systems are related to management information systems, but focus primarily on the company's markets and product sales. Defenders and Analyzers benefit more than Prospectors from inter-organizational systems due to the stability of their customers and suppliers. Strategic decision support systems play a major role in all three configurations (Sabherwal and Chan, 2001).

Table 3 IS Strategy Profiles of Defenders, Prospectors, and Analyzers

IS Strategy Attributes	Defenders	Prospectors	Analyzers
	IS for Efficiency	IS for Flexibility	IS for Comprehensiveness
Operational support systems	High	Low	Medium
Market information systems	Low	High	High
Inter-organizational systems	High	Medium	High
Strategic decision support systems	High	High	High

Source: Sabherwal and Chan, 2001

Sabherwal and Chan summarized and examined the related model, and then they compiled the following table 4.

Table 4 Levels of Alignment between Various Business and IS Strategies

	Defenders	Prospectors	Analyzers
IS for Efficiency	High	Low	Low
IS for Flexibility	Low	High	Low
IS for Comprehensiveness	Low	Low	High

Source: Sabherwal and Chan, 2001

Baets applied IS strategy alignment to banking, and suggested that the main problem in generating improved IS strategy alignment is a lack of overall sector knowledge among bank managers (Baets, 1996). Teo and Ang presented the results of an empirical study of IS executives on the relative importance of various Critical Success Factors (CSFs) for aligning IS plans with business plans. They suggested three CSFs: top management commitment to the strategic use of IT, IS management knowledge about business, and top management confidence in the IS department (Teo and Ang, 1999).

2.3. Business and IS Strategic Alignment

Too much attention is placed on technology than business, management, and organizational issues (Luftman, Lewis and Oldach, 1993). An effective strategic IS planning process must have internal consistency, particularly between the strategic business plan and the strategic IS plan (Henderson and Sifonis, 1988).

Broadbent and Weill (1993) made an empirical study that explored business and information strategy alignment in the information intensive and competitive Australian banking industry. They identified organizational practices that contribute to alignment and outlined a series of questions with which managers can review the practices of their firm.

Chan et al. (1997) measured business strategic orientation, IS strategic orientation, and IS strategic alignment. They concluded that these three factors have positive impacts on business performance.

King (1978) suggested that IS strategic planning is devised after business strategies. Henderson and Venkatraman (1991, 1993) argued that it should be a concurrent activity that allows the potential of emerging technology to directly influence the strategic direction of the

firm. They proposed the Strategic Alignment Model (SAM), which specifies two types of integration between business and IT domains. The definition of strategic alignment involves two dimensions: Strategic Fit and Functional Integration. Strategic Fit recognizes the need to make choices as Business Strategy that positions the firm in a market. The choices determine the internal structure of the firm's Organizational Infrastructure and Processes. Functional Integration, on the other hand, requires both an external positioning perspective, which is the IT Strategy, and an internal infrastructure perspective called IT Infrastructure and Processes.
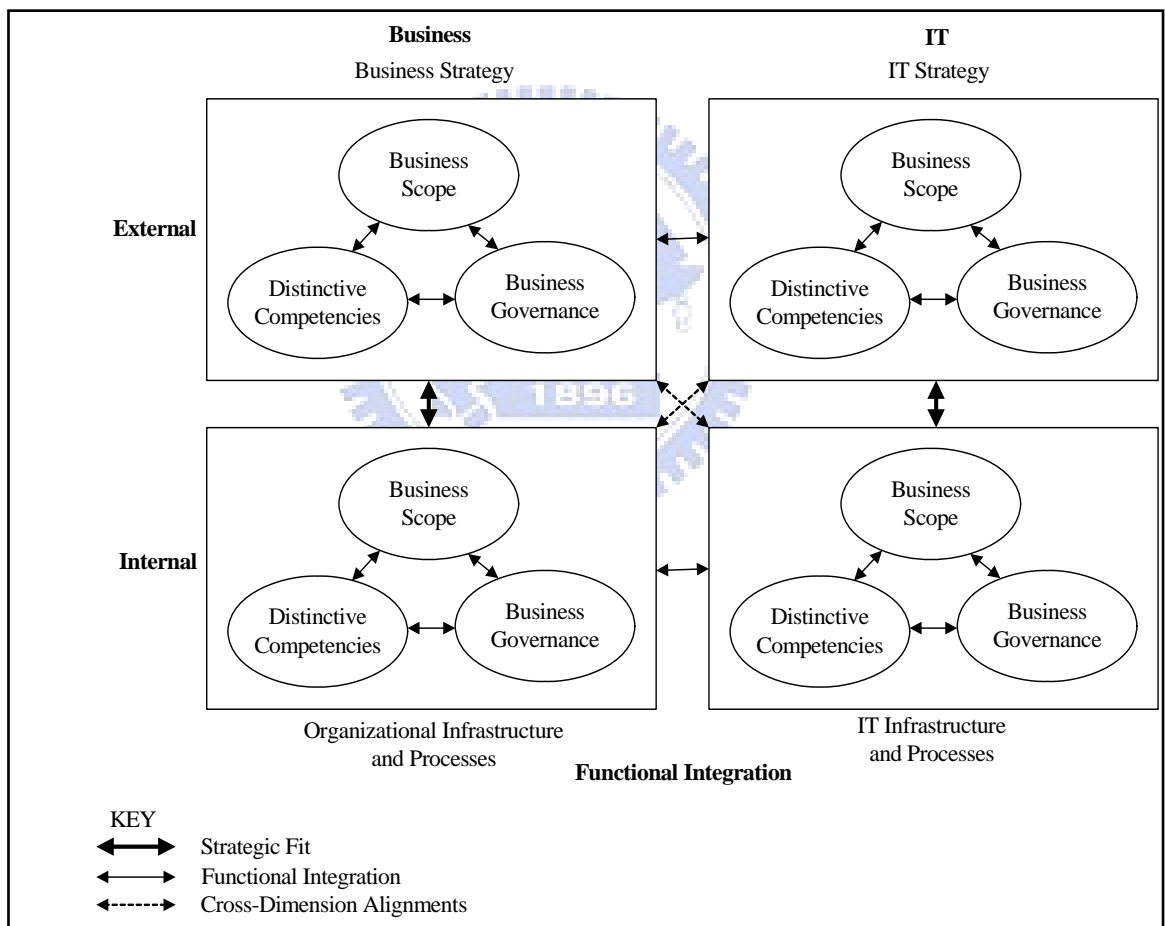
Figure 2 Strategic Alignment Model

Source: Henderson and Venkatraman, 1991

Saberwal, Hirschheim and Goles (2001) examined the dynamics of changes in alignment through strategy/ structure interactions in the business and IS domains. They described the evolution of information systems alignment with organization strategy and structure, and showed that theories of organization design, strategy, and information technology management can be integrated to yield insights into alignment processes.

Bergeron, Raymond and Rivard (2004) found that low performance firms exhibit a conflictual coalignment pattern of business strategy, business structure, IT strategy, and IT structure that distinguishes them from other firms.
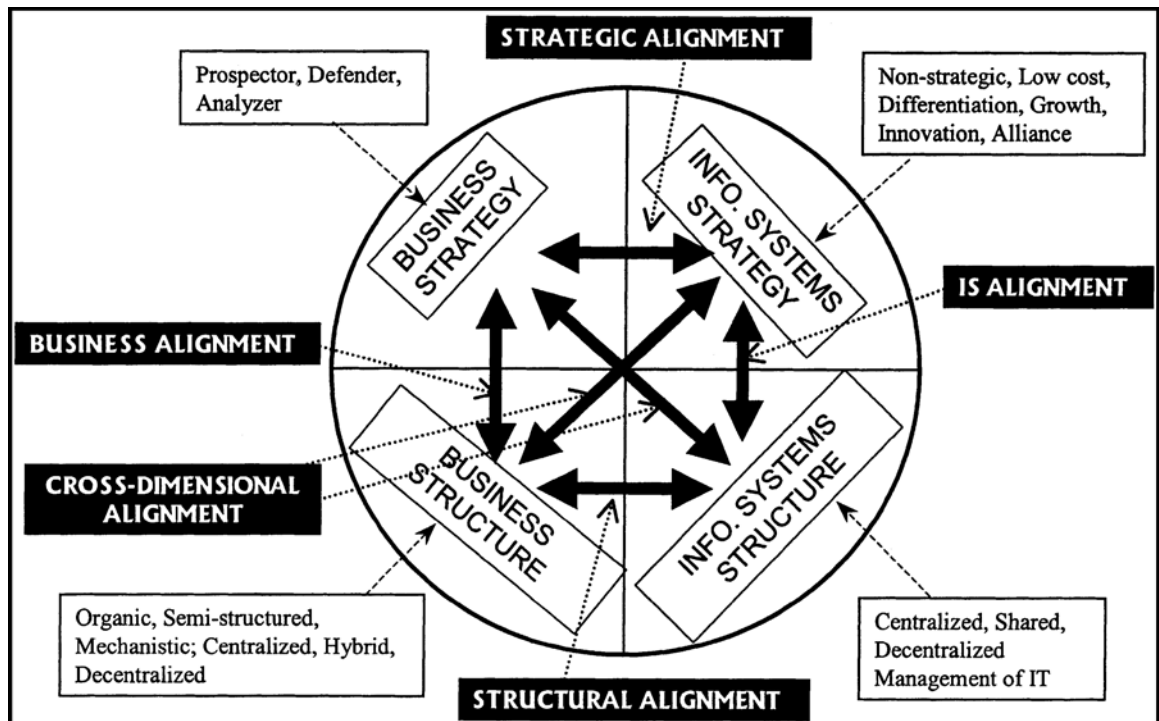
Figure 3 Strategic Information Systems Management Profile

Source: Saberwal, Hirschheim and Goles, 2001

3. Research Methodology and Implementation

3.1. Co-citation Method

We use the co-citation method to empirically analyze the the business and IS strategic alignment theory from an inductive perspective (Acedo, Barroso and Galan, 2006). There are two reasons for using a bibliometrical method: 1) to present a complete picture of the theory, and 2) to be objective. Bichteler and Eaton (1980) compared the results of bibliographic coupling and co-citation with users' evaluations. They found that changing from the bibliographic coupling measure to the linkage similarity measure, which introduces co-citation data, resulted in better retrieval performance (Bichteler and Eaton, 1980).

The scholarly journal is the major formal channel research and other scholarly activities are recorded and communicated. Researchers in any academic discipline tend to cluster into informal networks, which focus on common problems in common ways (Culnan, 1986; Price, 1963). Within these networks, one researcher's concepts and findings are soon picked up by another to be extended, tested and refined; in this way, each researcher's work builds on that of another (Culnan, 1986). By analyzing the citations of references in journal articles, researchers can identify the "core" literature of various fields of scholarship as represented in their journal literature and study synchronous and diachronous patterns of literature aging (McCain, 1991).

Co-citation is the frequency with which two items of earlier literature are cited together by the later literature. The number of identical citations defines the strength of the co-citation of the two cited papers (Small, 1973).

Author co-citation analysis (ACA) has been widely used in bibliometrics as an analytical method for analyzing the intellectual structure of science studies. It can also be used to identify authors from the same or similar research fields (He and Hui, 2002). Author co-citation analysis

was innovated by White and Griffith (1981). Many works have addressed the development or use of author co-citation analysis (e.g., Culnan, 1986; He and Hui, 2002; Rowlands, 1999; White, 1990; White, 2003a; White, 2003b).

Authors are a viable unit of analysis standing between the better-known units in citation and co-citation studies-articles on the one hand and journals on the other (White, 1990). We use individual articles as the unit of analysis because 1) the history of strategic alignment is not as long and wide as a topic like "management information systems" or "resource based theory", and this causes quantities of papers are not enough; and 2) analysis based on individual articles results in groupings similar to those at the level of oeuvres (White, 1990).

The more often two documents are cited together, the closer the relationship between them will be (White, 1981). This "relationship" only means that authors address the same broad questions, not that they necessarily agree with each other (Acedo, Barroso and Galan, 2006).

In the first step of the co-citation method, we need to find the core papers or authors for the area of interest (Acedo, Barroso and Galan, 2006). Then, in the second step, we set some rules for deciding if a paper can indeed be included as core paper, and enlarge core paper dataset as much as possible.

After compiling the core paper dataset, we collect the co-citation counts (when two documents are cited in the same paper, then the number of co-citation plus 1) into a co-citation matrix. The resulting data may be thought of as each author's profile of co-citations with every other author on the list (White, 1981). Then, we can obtain the Pearson correlation matrix.

Two advantages of transforming a raw co-citation matrix into a correlation matrix are data standardization and a reduction of the number of zeros in the matrix. Data standardization can avoid the scale effects caused by the number of citations of different documents, while reducing the number of zeros prevents problems in the application of statistical methods (White, 1981). In

this procedure, the diagonals are computed by taking the three highest intersections for each author and dividing them by two, thereby indicating in a general way the relative importance of a particular article or author within the field of interest (Culnan, 1986; White, 1981). Finally, we can apply factor analysis and multidimensional scaling analysis on the correlation matrix.

The process of co-citation methodology is shown in Figure 4. We follow the process proposed by White and Griffith in their published paper (White and Griffith, 1981).

```
┌─────────────────────────────┐
│      Choose the topic       │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐        1. To find out the core papers or authors
│      Paper collection       │        2. To utilize an ad hoc heuristic method for the reasons
└─────────────────────────────┘        of objective and maintaining the basic principles of the
              │                        co-citation method.
              ▼
┌─────────────────────────────┐        1. To set some qualifications to include papers among
│    Core paper selection     │        the core papers
└─────────────────────────────┘        2. To enlarge core papers as large as possible
              │
              ▼
┌─────────────────────────────┐
Not enough │  Confirm the amount of papers│
└─────────────────────────────┘
              │  Enough
              ▼
┌─────────────────────────────┐
│   Produce a co-citation matrix │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐        1. Transforming the raw co-citation count matrix to
│ Transformation to a correlation matrix │ correlation matrix
└─────────────────────────────┘        2. For data standardization and reduce the number of
              │                        zeros existing in the matrix
              ▼
┌─────────────────────────────┐        1. Factor analysis
│     Statistical analysis    │        2. Multidimensional scaling analysis
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    Discuss and conclusion   │
└─────────────────────────────┘
```
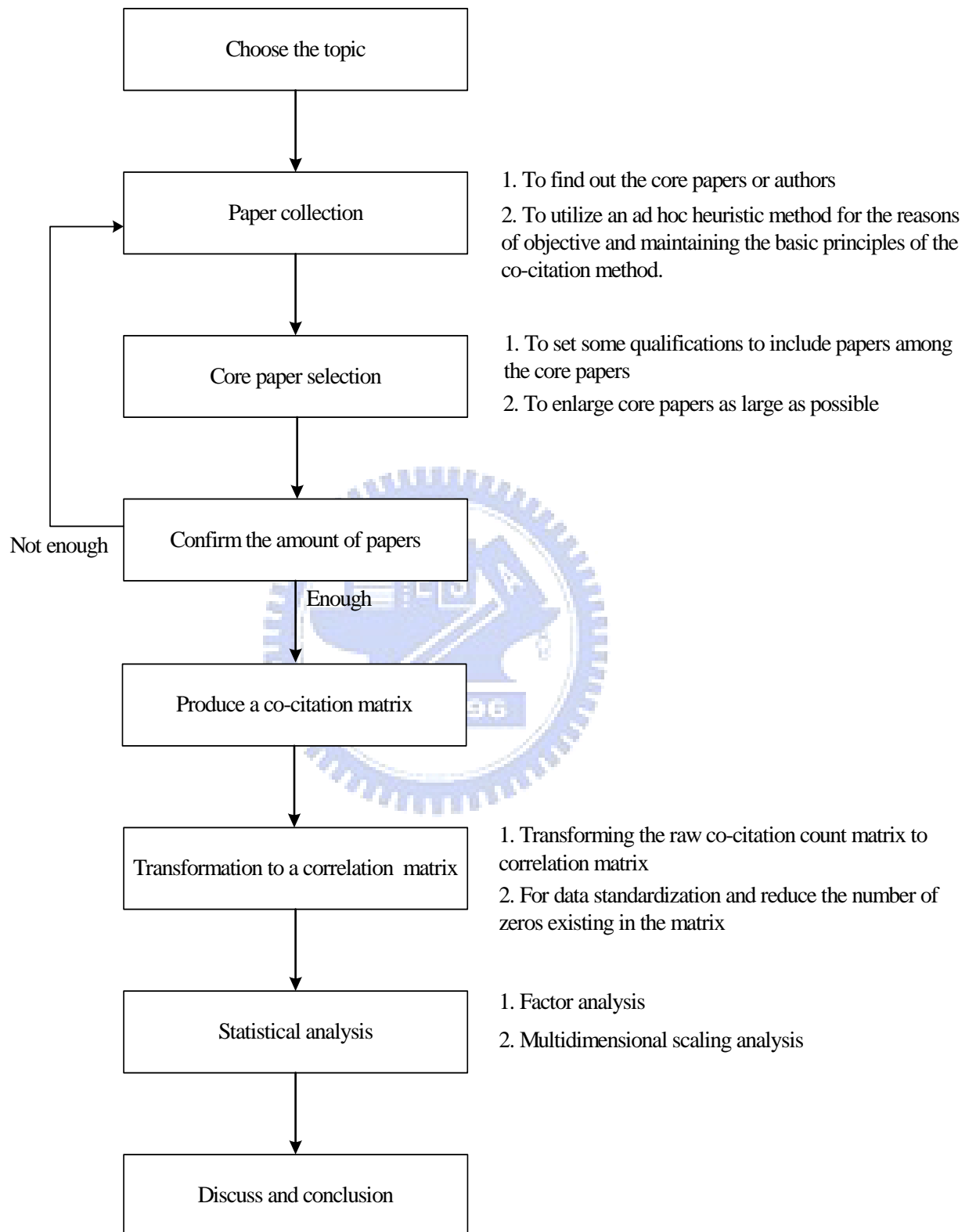
Figure 4 Co-citation Methodology

3.2. Implementation

3.2.1. Paper Collection

For reasons of objectivity and to maintain the basic principles of the co-citation method, we utilize an ad hoc heuristic method to find out the total papers that are topic related and then collect as many core papers as possible.

We use two ad hoc heuristic methods. One is derived from the Acedo, Barroso and Galan's method (2006). It is a 'snowball' process that we extend our dataset of core papers from a small core. The other method is to search in Google Scholar (http://scholar.google.com) for related papers by using keywords like 'strategic alignment' and 'alignment'. Finally, we use the number of citations listed by Google Scholar for the papers collected by the above methods. All of the data (number of citations per paper) was downloaded from Google Scholar on March14, 2007.

In the first method, we use three initial core papers: (1) Miles and Snow's (1978) paper, which defines three strategic types of organization, Defenders, Analyzers, and Prospectors, to explain how organizations move through the adaptive cycle and the methods they adopt to solve their entrepreneurial, engineering and administrative problems. (2) Sabherwal and Chan's (2001) work, which examines the impact of alignment on perceived business performance using Miles and Snow's popular classification of Defender, Analyzer, and Prospector business strategies. (3) Henderson and Venkatraman's (1993) study, which argues IS strategic planning should be a concurrent activity that allows the potential of emerging technology to directly influence the strategic direction of the firm. Henderson and Venkatraman developed the Strategic Alignment Model (SAM) to identify two integrated types between business and IT domains. The three papers are important to the theoretical development of business and IS strategic alignment and they all have large number of citations for helping the analysis. Prior to March 14, 2007, they had

been cited 1046, 75, and 446 times, respectively.

From the reference papers of three initial core papers we use and papers citing them, we can gather further possible core papers. If these new papers comply with the rules for selecting core papers, they are added to the core paper dataset and used to find out other possible core papers from the references of these new core papers and papers citing them.

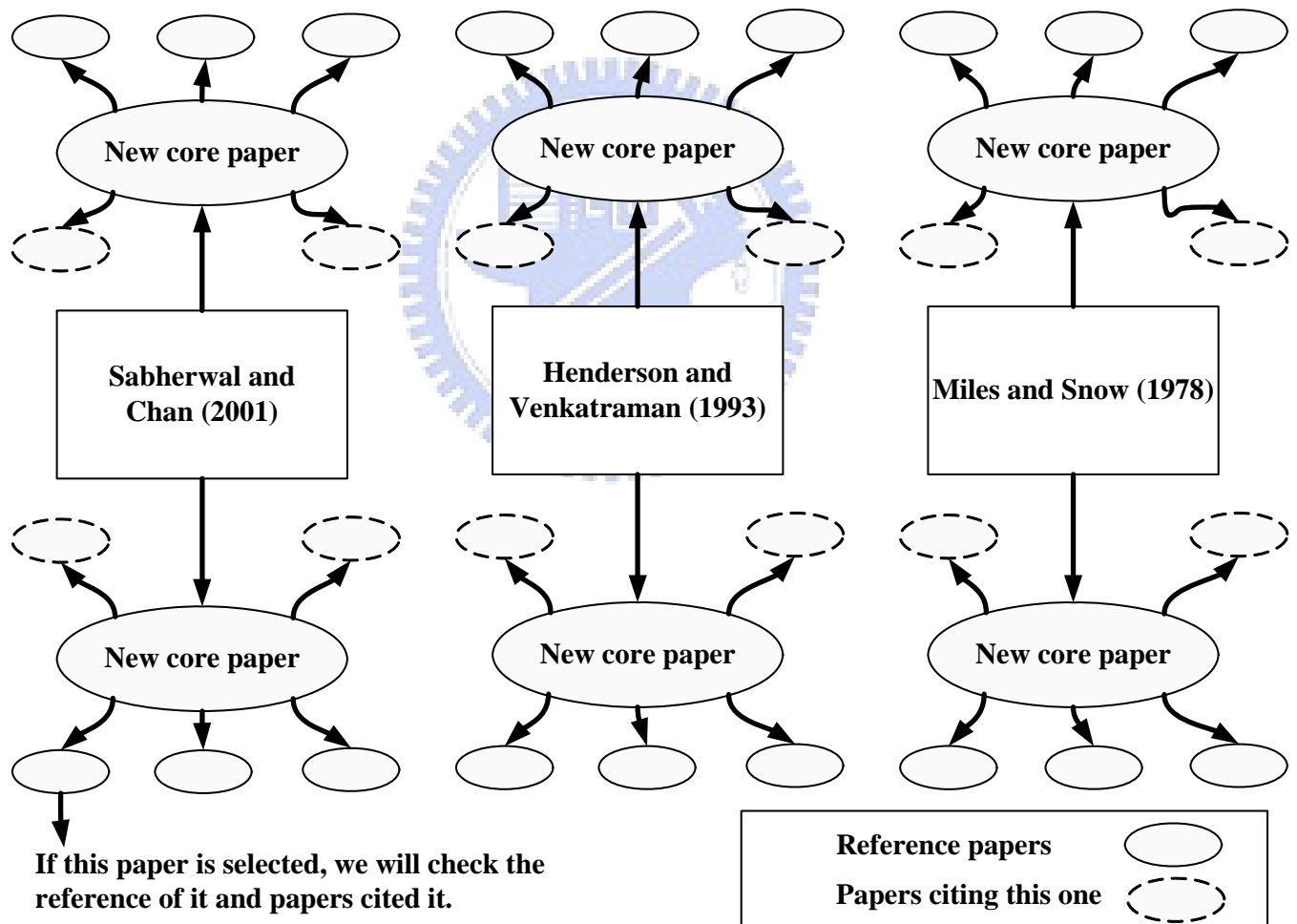We run the paper collection step and core paper selection step alternately until we have enough core papers.

Figure 5 Paper Collection Processes

3.2.2. Core Paper Selection

The rules for selecting core papers are:

1. Papers from SCI or SSCI journals: To avoid having too many papers, especially papers that are not good enough, the first rule is that a paper must have been published in an SCI or SSCI journal to be considered as core paper. If the article is from a book, we use criteria two and three to decide whether to include it the core paper pool.

2. Times cited: The number of times a paper has been cited represents its quality. Obviously, newer papers will have had fewer chances of being cited than older ones. Therefore, the number of citations required for a paper to be considered a core paper depends on when it was published. We divide publications into four periods: the 1970s, 80s, 90s, and since 2000; and the minimum number of citations is 50, 40, 30, and 20 respectively.

3. Topic relevance: The only subjective criterion is the topic's relevance. If we can analyze total papers in the area of business and IS strategic alignment, the problem of subjectivity will be resolved. In other words, the more topic-related papers we can analyze, the less subjective the results will be. To apply this criterion, we have to check papers manually. To do this, we check the subject, abstract, and even the content of each candidate paper.

After completing Steps 1 and 2, we had 44 core papers, as shown in Table 5.

Table 5 Core paper list

Avison D, Jones J., Powell P. Wilson D.	2004	Journal of Strategic Information Systems 13(3): 223-246
Boynton AC, Zmud RW	1987	MIS Quarterly 11(1): 59-71
Broadbent M, Weill P	1993	IBM Systems Journal 32(1): 162-179
Broadbent M, Weill P, Clair DS	1999	MIS Quarterly 23(2): 159-182
Brown CV, Magill SL	1994	MIS Quarterly 18(4): 371
Burn JM, Szeto C	2000	Information & Management 37(4): 197-216
Chakravarthy BS	1987	Strategic Management Journal 8(6): 517-534
Chan YE	2002	MIS Quarterly Executive 1(21): 76 - 112
Chan YE, Huff SL, Barclay DW, Copeland DG	1997	Information Systems Research 8(2): 125-150
Chester AN	1994	Research Technology Management 37(1): 25-32
Croteau AM, Bergeron F	2001	Journal of Strategic Information Systems 37(1): 25-32
Earl MJ	1989	NJ: Prentice-Hall Inc
Grant RM	2003	Strategic Management Journal 24(6): 491-517
Henderson JC	1990	Sloan Management Review 31(3): 7-18
Henderson JC, Sifonis JG	1988	MIS Quarterly 12(2): 187-200
Henderson JC, Venkatraman N	1991	Business Quarterly 55(3): 72-78
Henderson JC, Venkatraman N	1992	New York: Oxford University Press
Henderson JC, Venkatraman N	1993	IBM Systems Journal 32(1): 4-16
Jackson PJ	1999	Information Systems Journal 9(4): 313
Johnston HR, Carrico SR	1988	MIS Quarterly 12(1): 37-48
Johnston HR, Vitale MR	1988	MIS Quarterly 12(2): 153-165
Jordon E., Tricker B.	1995	Journal of Strategic Information Systems 4(4): 357-382
Karimi J, Gupta YP, Somers TM	1996	Journal of Management Information Systems 12(4): 55-88
Kearns GS, Lederer AL	2000	Journal of Strategic Information Systems 9(4): 265-293
King WR	1978	MIS Quarterly 2(1): 27-37
Konsynski BR	1993	IBM Systems Journal 32(1): 111-142
Luftman JN, Lewis PR, Oldach SH	1993	IBM Systems Journal 32(1): 198-221
Luo Y, Park SH	2001	Strategic Management Journal 22(2): 141-155
McLean ER, Soden JV	1977	McKinsey and Company
Miles RE, Snow CC	1978	New York: McGraw-Hill
Palmer JW, Markus ML	2000	Information Systems Research 11(3): 241-259
Pyburn PJ	1983	MIS Quarterly 7(2): 1-14
Reich BH, Benbasat I	1996	MIS Quarterly 20(1): 55-81
Reich BH, Benbasat I	2000	MIS Quarterly 24(1): 81-113
Sabherwal R, Chan YE	2001	Information Systems Research 12(1): 11–33
Sabherwal R, Hirschheim R, Goles T	2001	Organization Science 12(2): 179-197
Santhanam R, Hartono E	2003	MIS Quarterly 27(1): 125-153
Segars AH, Grover V	1999	Information Systems Research 10(3): 199-232
Teo TSH, Ang JSK	1999	International Journal of Information Management 19(2): 173-185
Teo TSH, King WR	1997	Journal of Management Information Systems 14(1): 185-214
van der Zee JTM, de Jong B	1999	Journal of Management Information Systems 16(2): 137-156
Venkatraman N	1989	Management Science 35(8): 942-962
Venkatraman N, Henderson JC, Oldach S	1993	European Management Journal 11(2): 139
Wiseman C	1988	McGraw-Hill Professional

3.2.3. Producing a Matrix

Producing a 44 x 44 matrix is time consuming and prone to error because it is necessary to check every two papers' co-citation paper and count it. For example, we check the papers that both cite Chan (2002) and Chester (1994), and the number of these papers is the co-citation count of Chan (2002) and Chester (1994). To overcome these two problems, we build a database to handle process of producing this matrix.

First of all, we arrange the 44 papers and assign them numbers, after which we build two database tables. The first is a "citation" table that contains three fields: 1) "CorePaperSerial", which details the serial numbers of 44 core papers; it is the primary key of this table; 2) "SubPaperSerial", which lists the serial numbers of papers that cite one of the core papers. 3) "SubPaperSubSerial" are redundant values of "SubPaperSerial" that will be updated after the next step. The second table is called the "subpapers" table. It stores the data about papers in the citation table, such as author, topic, and year of publication.

The next step is to sort the data in the "subpapers" table using the topic as the sort criterion. After sorting, we compare the author, published year, and topic of each paper with every other papers. If they are the same, the value of "SubPaperSubSerial" field of the "citation" table will be updated to the same number. According to the value of "SubPaperSerial", we know the paper of this "SubPaperSerial" cite the paper of "CorePaperSerial". From the same value of "SubPaperSubSerial", we have many "SubPaperSerial" values and know that these papers are the same one. Moreover, we can find out papers of "CorePaperSerial" are cited by these papers of "SubPaperSerial" and actually the papers of "CorePaperSerial" are cited by the same paper. Finally, we count every two core papers' co-citation number by comparing the "SubPaperSubSerial" field.

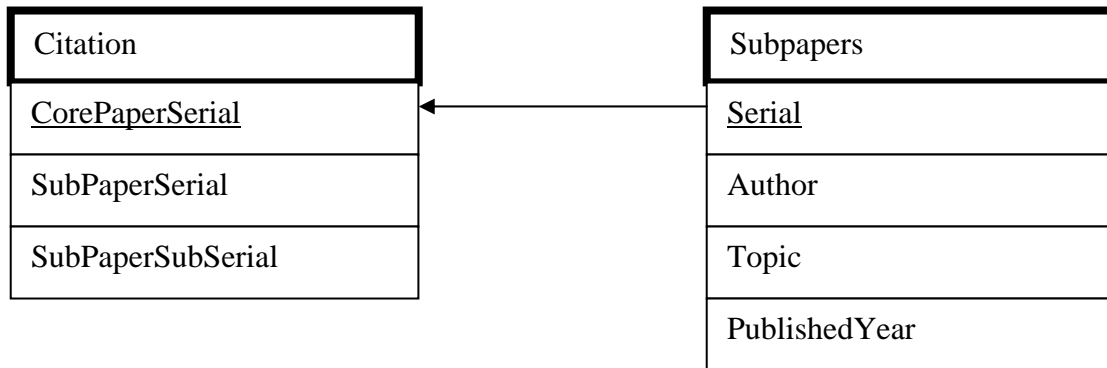By using this method, we can avoid using complex SQL commands or spending a lot of time on computations..

Citation		Subpapers
<u>CorePaperSerial</u>	←	<u>Serial</u>
SubPaperSerial		Author
SubPaperSubSerial		Topic
		PublishedYear

Figure 6 Database Schema

3.2.4. Transformation to a Correlation Matrix

We collect the co-citation counts (when two documents are cited by the same paper, then count plus 1) and transform the co-citation matrix into a Pearson correlation matrix.

There are two advantages in transforming the raw co-citation matrix into a correlation matrix: (i) the data is standardized, and (ii) the number of zeros in the matrix is reduced. The correlation matrix shows that the relationships of the following five papers are weak with the other papers. Therefore, we drop them.

Avison D, Jones J., Powell P. Wilson D.	2004	Journal of Strategic Information Systems 13(3): 223-246
Chester AN	1994	Research Technology Management 37(1): 25-32
Jackson PJ	1999	Information Systems Journal 9(4): 313
Jordon E., Tricker B.	1995	Journal of Strategic Information Systems 4(4): 357-382
Luo Y, Park SH	2001	Strategic Management Journal 22(2): 141-155

We now have 39 core papers for statistical analysis

4. Data Analysis and Findings

To reduce the number of dimensions and present the analysis results, we use two typical

statistical techniques: 1) factor analysis with varimax rotation; and 2)multidimensional scaling

(MDS) to show the graphics of the trends.

In this chapter, the numbers represent papers (e.g., [v16] and [v30]) can be matched with the

lists in Table 7 or Table 8.

4.1. Factor Analysis

Table 7 is the rotated solution of factor analysis. We rank the factor loadings on papers of

factor 1 with a 0.40 minimum cutoff point. If the factor of a document loads on more than one

factor, it means that the document serves as a bridge between the factors. For example, [v16] and

[v30] loaded on factor 1 and factor 3 in Table 7 are represented as "Alignment theory and Model

development" and "IS and Competitive Advantage". The two papers are related to both topics.

Negative loadings indicate reverse co-citation profiles between a given document and the other

works expressed by that factor. In other words, if a paper cites one document with positive

loading, the other one with negative loading will not be cited by the paper (Acedo, Barroso and

Galan, 2006).

Six factors are extracted, and they explain 78.3% of the total variance. However, the first

two factors account for most of the variance. The first factor accounts for 50.2% of the variance

and the second for 10.6%. The other results are 5.9% (factor 3), 4.6% (factor 4), 4.3% (factor 5)

and 2.6% (factor 6). The factor topics are listed in Table 6.

In Table 7, Factor 1 represents "Alignment theory and Model development" and includes 23

papers. Many kinds of topics are covered by this factor, for example, Strategic Information Systems, Balanced Scorecard, and Company Performance. However, they are all about theory development and confirmative research. Business and strategic IS alignment theory is mainly covered by [v14] [v15] [v16] [v30]. Henderson and Venkatraman [v14] [v16] defined the Strategic Alignment Model (SAM) to identify two types of integration between business and IT domains. Henderson and Vankatraman's [v15] work proposed a framework for strategic alignment. The model deals with business strategy, IS strategy, and organizational and IT processes and infrastructures. Sabherwal and Chan developed ideal business strategy profiles for three configurations, Defenders, Analyzers and Prospectors. The others, [v02] [v05] [v08] [v29] [v33] and [v34] are related to business and strategic IS alignment Confirmative Research. Chan et al. [v08] discussed how IS strategically developed and how IS strategy alignment can be measured. They also investigated the impact of strategic alignment on the effectiveness of the IS function and on the overall performance of business. Segars and Grover's [v33] findings show that five distinct profiles of strategic planning can be identified based on the dimensions of comprehensiveness, formalization, focus, flow, participation, and consistency. An empirical study made by Broadbent and Weill [v02] explored business and information strategy alignment in the information intensive and competitive Australian banking industry. Teo and Ang [v34] presented the results of an empirical study of IS executives on the relative importance of various CSFs for aligning IS plans with business plans.

Factor 2, called "IS Planning" covers 12 papers: [v38] [v35] [v33] [v01] [v06] [v10] [v13] [v17] [v21] [v24] [v27] [v39]. Papers loaded on this factor are related to business planning, IS strategic planning, IT capabilities, and SIS. They focus on strategic planning activities, critical success factors for strategic planning, and IS-based resource planning to gain a competitive advantage. Henderson and Sifonis [v13] concluded that an effective strategic IS planning process must

provide internal consistency, particularly between the strategic business plan and the strategic IS plan. Earl's work [v10] discusses information systems strategy formulation, and critical issues in information systems research. Johnson and Carrico [v17] discussed how an organization develops capabilities to use information strategically. Their findings indicate that competitive advantage depends on the interaction between industry conditions and internal capability to identify and exploit opportunities.

Factor 3 represents "IS and Competitive Advantage". Creating a competitive advantage using information systems and relationship of IS and firm performance are the related topics in this factor. Miles and Snow's work [v25] developed a well-known business strategy typology, i.e., Prospectors, Defenders, Analyzers, and Reactors, which is widely used in the research of management. The relationship between IT and performance are discussed in [v26] [v19] [v32] [v39]. Venkatraman discussed the strategic orientation of business enterprises (STROBE operationalization of business strategy) in [v37].

Factors 4, 5 and 6 overlap many papers with factors 1 and 2; hence, the topics of factors 4, 5, and 6 not very clear, especially factor 4 and 5. Factor 4, "IT and IS Strategy", includes [v20] [v34] [v23] [v10] [v17] [v22], and considers how to use IT and IS strategy to maximize the capability of a company. Factor 5 is related to the "Strategic alignment process", like the alignment-as-intend, BPR, and includes papers [v02] [v03] [v23] [v10] [v18]. The last factor concerns "Evidence in Strategic Planning". About the factor 6, "Evidence in Strategic Planning", low factor loading in [v22] reveals that it's not closed to this factor. The other two papers of factor 6, [v06] and [v11], are highly concerned with this topic.

Table 6 Factor Topics

Factor 1:	Alignment theory and Model development
Factor 2:	IS Planning
Factor 3:	IS and Competitive Advantage
Factor 4:	IT and IS Strategy
Factor 5:	Strategic alignment process
Factor 6:	Evidence in Strategic Planning

Table 7 Factor analysis with factor loadings at 0.40 or higher

No.	Authors	Year	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
v 07	Chan YE	2002	.932					
v 14	Henderson JC, Venkatraman N	1991	.847					
v 04	Brown CV, Magill SL	1994	.819					
v 36	van der Zee JTM, de Jong B	1999	.812					
v 29	Reich BH, Benbasat I	2000	.810					
v 12	Henderson JC	1990	.763					
v 31	Sabherwal R, Hirschheim R, Goles T	2001	.763					
v 05	Burn JM, Szeto C	2000	.744					
v 38	Venkatraman N, Henderson JC, Oldach S	1993	.739	.401				
v 26	Palmer JW, Markus ML	2000	.734		.493			
v 09	Croteau AM, Bergeron F	2001	.722					
v 28	Reich BH, Benbasat I	1996	.715					
v 20	Kearns GS, Lederer AL	2000	.707			.426		
v 30	Sabherwal R, Chan YE	2001	.697		.434			
v 35	Teo TSH, King WR	1997	.697	.456				
v 02	Broadbent M, Weill P	1993	.684				.429	
v 34	Teo TSH, Ang JSK	1999	.641			.538		
v 08	Chan YE, Huff SL, Barclay DW, Copeland DG	1997	.629					
v 16	Henderson JC, Venkatraman N	1993	.614		.601			
v 03	Broadbent M, Weill P, Clair DS	1999	.602				.416	
v 33	Segars AH, Grover V	1999	.588	.415				
v 23	Luftman JN, Lewis PR, Oldach SH	1993	.583			.513	.535	
v 15	Henderson JC, Venkatraman N	1992	.420		.770			
v 01	Boynton AC, Zmud RW	1987		.783				
v 06	Chakravarthy BS	1987		.481				.701
v 10	Earl MJ	1989		.543		.465	.561	
v 11	Grant RM	2003						.932
v 13	Henderson JC, Sifonis JG	1988		.873				
v 17	Johnston HR, Carrico SR	1988		.642		.407		
v 18	Johnston HR, Vitale MR	1988					.757	
v 19	Karimi J, Gupta YP, Somers TM	1996			.679			
v 21	King WR	1978		.789				
v 22	Konsynski BR	1993				.649		
v 24	McLean ER, Soden JV	1977		.916				
v 25	Miles RE, Snow CC	1978			.687			
v 27	Pyburn PJ	1983		.874				
v 32	Santhanam R, Hartono E	2003			.430			
v 37	Venkatraman N	1989			.459			.423
v 39	Wiseman C	1988		.651	.539			

4.2. Multidimensional Scaling Analysis

In Figure 7, the y-axis shows the division between strategic planning and non-planning. Within strategic planning, the right-hand side of the figure, 5 subgroups (three large and two small) can be identified. First subgroup is half of the factor 1 group in quadrant I, which is the Theory and Confirmative Research group. Some papers or books, such as works by Henderson and Venkatraman (1991) [v14], Venkatraman, Henderson and Oldach (1993) [v38], Palmer and Markus (2000) [v26], and Broadbent and Weill (1993) [v02] are included. The second subgroup has the most members of factor 2, the Strategic Planning group in quadrant III. [v38] and [v35] are covered by the first group. Papers like those of Teo and King (1997) [v35], Venkatraman Henderson and Oldach (1993) [v38], Earl (1989) [v10], and Henderson and Sifonis (1988) [v13], belong to this group. In the right-hand field of groups 1 and 2, the third large subgroup is also the factor 3, the IS and Competitive Advantage factor. Most of factor loadings of the papers in this subgroup load on factor 1 or factor 2 too, so we can see the graph of the third subgroup stretch some area to the first group and the second group. Papers in the third subgroup, like Miles and Snow (1978) [v25], Santhanam and Hartono (2003) [v32], Wiseman (1988) [v39], are also in the second subgroup, while Palmer and Markus (2000) [v26] is also in the first subgroup. The other groups, one is Konsynski's work (1993) [v22] as the fourth group, and another is Johnston and Vitale's paper (1988) [v18] as the fifth group. The two groups are not the main factors can explain more than 5% of the variance, they are influenced by factor 1 and 2, and that's why they both form the groups just with one paper. On the left-hand side, the rest half of factor 1 and the factor 6 are there. Factor 6 consists of papers by Grant (2003) [v11] and Chakravarthy (1987) [v06].

The x-axis in Figure 7 separates two kinds of papers: theoretical papers are above the axis, while applied papers (non-theoretical) are below. Group 1, the Alignment theory and Model

development group, so it is above the axis. Most group 2 papers are applied papers; therefore, they are located below the axis.

Multidimensional scaling analysis can almost explain the outcome of factor analysis totally. We are sure that the grouping can be explained by factor analysis and multidimensional scaling at the same time, which means the results are double-checked.
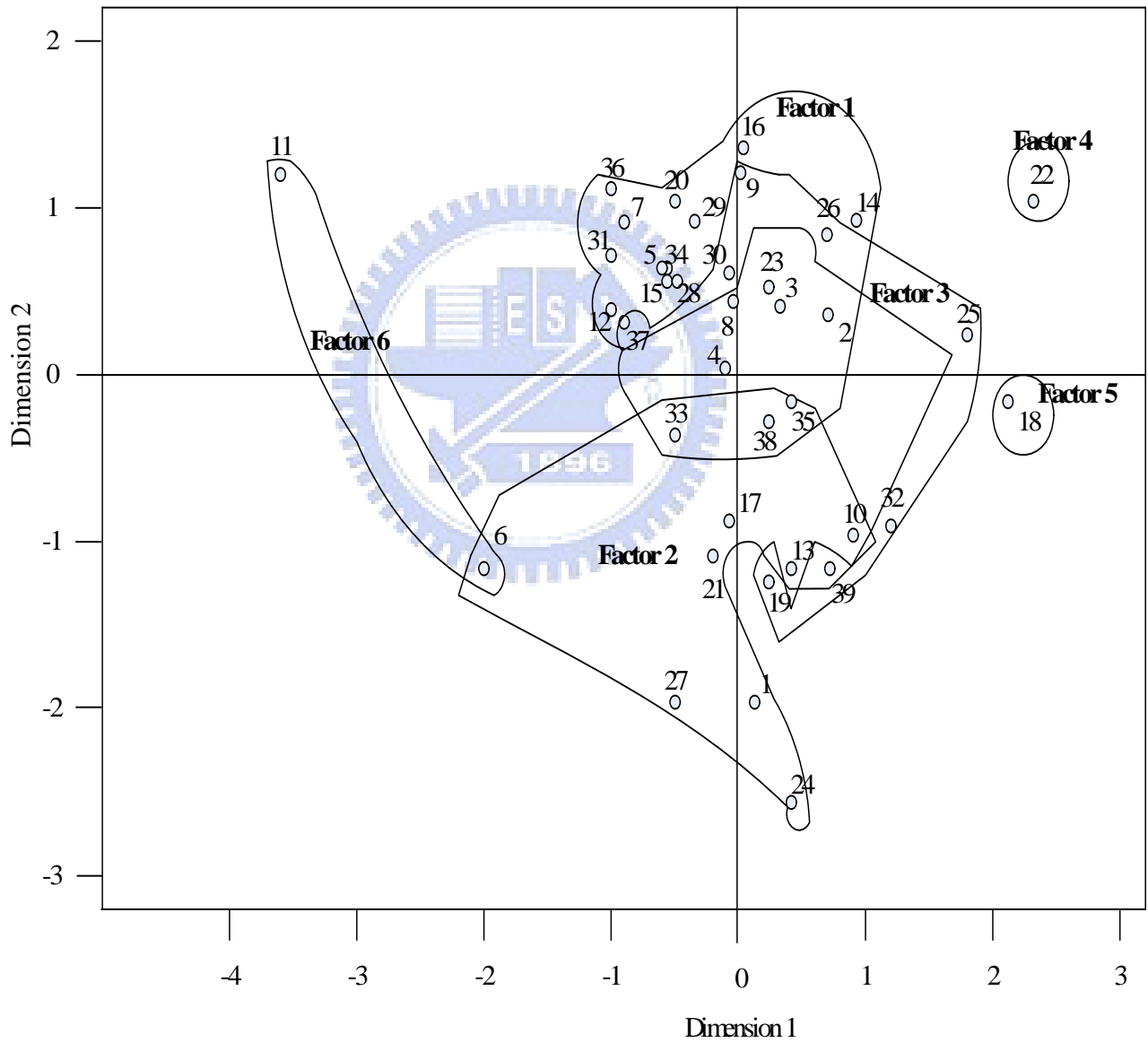

Figure 7 Multidimensional Scaling

Table 8 Core paper list with assigned numbers

No.	Author	Year	Topic
v01	Boynton AC, Zmud RW	1987	Information Technology Planning in the 1990's: Directions for Practice and Research
v02	Broadbent M, Weill P	1993	Improving business and information strategy alignment: Learning from the banking industry
v03	Broadbent M, Weill P, Clair DS	1999	The implications of information technology infrastructure for business process redesign
v04	Brown CV, Magill SL	1994	Alignment of the IS functions with the enterprise: toward a model of antecedents
v05	Burn JM, Szeto C	2000	A comparison on the views of business and IT management on success factors for strategic alignment
v06	Chakravarthy BS	1987	On tailoring a strategic planning system to its context: some empirical evidence
v07	Chan YE	2002	Why haven't we mastered alignment? The importance of the informal organization structure
v08	Chan YE, Huff SL, Barclay DW, Copeland DG	1997	Business strategic orientation, information systems strategic orientation, and strategic alignment.
v09	Croteau AM, Bergeron F	2001	An information technology trilogy: business strategy, technological deployment and organizational performance
v10	Earl MJ	1989	Management strategies for information technology
v11	Grant RM	2003	Strategic planning in a turbulent environment: evidence from the oil and gas majors
v12	Henderson JC	1990	Plugging into Strategic Partnerships: The Critical IS Connection
v13	Henderson JC, Sifonis JG	1988	The Value of Strategic IS Planning: Understanding Consistency, Validity, and IS Markets
v14	Henderson JC, Venkatraman N	1991	Understanding Strategic Alignment
v15	Henderson JC, Venkatraman N	1992	Strategic Alignment: A Model for Organizational Transformation Through Information Technology
v16	Henderson JC, Venkatraman N	1993	Strategic alignment: Leveraging information technology for transforming organizations
v17	Johnston HR, Carrico SR	1988	Developing Capabilities to Use Information Strategically
v18	Johnston HR, Vitale MR	1988	Creating Competitive Advantage with Interorganizational Information Systems
v19	Karimi J, Gupta YP, Somers TM	1996	Impact of competitive strategy and information technology maturity on firms' response to globalization
v20	Kearns GS, Lederer AL	2000	The effect of strategic alignment on the use of IS-based resources for competitive advantage
v21	King WR	1978	Strategic Planning for Management Information Systems
v22	Konsynski BR	1993	Strategic control in the extended enterprise
v23	Luftman JN, Lewis PR, Oldach SH	1993	Transforming the Enterprise: The Alignment of Business and Information Technology Strategies
v24	McLean ER, Soden JV	1977	Strategic Planning for MIS

Table 8 Core papers list with assigned number (cont.)

v25	Miles RE, Snow CC	1978	Organizational Strategy, Structure, and Process
v26	Palmer JW, Markus ML	2000	The Performance Impacts of Quick Response and Strategic Alignment in Specialty Retailing
v27	Pyburn PJ	1983	Linking the MIS Plan with Corporate Strategy: An Exploratory Study
v28	Reich BH, Benbasat I	1996	Measuring the linkage between business and information technology objectives
v29	Reich BH, Benbasat I	2000	Factors that influence the social dimension of alignment between business and information technology objectives
v30	Sabherwal R, Chan YE	2001	Alignment between business and is strategies: a study of prospectors, analyzers, and defenders
v31	Sabherwal R, Hirschheim R, Goles T	2001	The dynamics of alignment: insights from a punctuated equilibrium model
v32	Santhanam R, Hartono E	2003	Issues in linking information technology capability to firm performance
v33	Segars AH, Grover V	1999	Profiles of Strategic Information Systems Planning
v34	Teo TSH, Ang JSK	1999	Critical success factors in the alignment of IS plans with business plans
v35	Teo TSH, King WR	1997	Integration between business planning and information systems planning: an evolutionary-contingency perspective
v36	van der Zee JTM, de Jong B	1999	Alignment is not enough: integrating business and information technology management with
v37	Venkatraman N	1989	Strategic Orientation of Business Enterprises: The Construct, Dimensionality, and Measurement
v38	Venkatraman N, Henderson JC, Oldach S	1993	Continuous strategic alignment: exploiting information technology capabilities for competitive success
v39	Wiseman C	1988	Strategic Information Systems

4.3. Discussion and findings

From the results of factor analysis, we have 6 factors that represent the trends of business and IS strategic alignment. However, most papers that load on factors 4 and 5 also load on factors 1 and 2; hence, factors 4 and factor 5 do not appear as clear trends. We finally eliminate factors 4 and 5. About factor 6, we think it is a minority trend and it may be published in other journals or other topics. Extending the minority trend is discussed in the next chapter. Our findings represent trends in business and IS strategic alignment; the biggest trend is "Alignment theory and Model development". Although papers in this trend deal with different kinds of topics, they are all related to the development of alignment theory or models. Some empirical or confirmative papers are also included in this trend.

The next trend is "IS Planning", which contains papers on many kinds of information systems planning. They focus on strategic planning activities, critical success factors for strategic planning, and IS-based resource planning.

The third trend is "IS and Competitive Advantage", which covers topics like creating a competitive advantage using information systems, and the relationship between IS and a firm's performance.

The last trend is "Evidence in Strategic Planning", which only contains two papers. If we could expand the sources of this trend, a clearer topic or other trends may be found.

The classic and highly influential papers for the above four trends were discussed in the sections 4.1 and 4.2. In MDS, the y-axis shows the clear division between IS planning and non-IS planning, while the x-axis shows the theoretical and applied documents. We can also match these papers with the multidimensional scaling map to see which quadrant they belong to and the topics related to them.

5. Conclusion and Future Works

5.1. Conclusion

We have conducted an empirical analysis of business and IS alignment in order to identify the main trends and related classic and highly influential papers. Study is based on a bibliometric approach; more specifically, on co-citation analysis. To determine the core papers, an ad hoc procedure was employed to obtain a large pool of core papers to fulfill the requirements of relevance and similarity.

The factor analysis results show that six trends are exhibited, and we take four factors as the main trends. The main trends of business and IS strategic alignment are, in order of importance, "Alignment theory and Model development", "IS Planning", "IS and Competitive Advantage", and, "Evidence in Strategic Planning", which is a minority trend. In the multidimensional scaling analysis, the y-axis shows a clear division between IS planning and non-IS planning, while the x-axis divides the theoretical and applied documents. These two methods can verify the results clearly. Therefore, we have idea of the main trends and can identify classic works on business and IS strategic alignment.

5.2. Future Work

This thesis is an exploratory study of business and IS strategic alignment using the co-citation method. The limitation of this paper is that the first two factors account too much variance of factor analysis. If other factors account more, we could separate the papers as many groups with no coverage and the trends would be clearer.

Future work will include:

1. Expand the area of topic, like business strategy, IS strategy and strategic alignment in order to collect more papers. The larger the pool of core papers, the reliable the results will be.

2. For the minority trend, we could search for papers on topics related to our topic. Many related papers are published in other journals or are published in other area. For instance, papers related to ERP systems often cite alignment related papers. Therefore, the minority trend in this study, "Evidence in Strategic Planning", may become a majority trend by including ERP related papers.

3. To analyze the data using another method. We always use three statistical methods in the co-citation study. Factor analysis, multidimensional scaling analysis and clustering analysis are the three most popular methods. We could use other method to verify our data and compare the results with those of the above three traditional methods. For example, social network analysis maybe a good method to analyze the data.

4. Because the co-citation relationship between two papers is dynamic, we could develop a dynamic co-citation analysis system to produce a dynamic result. A dynamic trend and dissemination can be reported in this dynamic system.

References

[1] Acedo, F.J., C. Barroso and J.L. Galan, "The Resource-Based Theory: Dissemination and Main Trends, " *Strategic Management Journal*, 27(7), 2006, pp.621-636.

[2] Avison, D., J. Jones, P Powell and D. Wilson, "Using and validating the strategic alignment model, " *Journal of Strategic Information Systems*, 13(3), 2004, pp.223-246.

[3] Baets, W.R.J., "Some Empirical Evidence on IS Strategy Alignment in Banking", *Information and Management*, 30(4), 1996, pp.155-177.

[4] Bergeron F., L. Raymond, and S. Rivard, "Ideal patterns of strategic alignment and business performance, " *Information and Management*, 41(8), 2004, pp.1003-1020.

[5] Bichteler, J., and E.A. Eaton, "The combined use of bibliographic coupling and cocitation for document retrieval", *Journal of the American Society for Information Science,* 31, 1980, 278-282.

[6] Boynton, A.C., and R.W. Zmud, "Information Technology Planning in the 1990's: Directions for Practice and Research", *MIS Quarterly*, 11(1), 1987, pp.59-71.

[7] Broadbent, M. and P. Weill, "Improving Business and Information Strategy Alignment: Learning from the Banking Industry, " *IBM Systems Journal*, 32(1), 1993, pp.162-179.

[8] Broadbent, M., P. Weill, and D.S. Clair, "The implications of information technology infrastructure for business process redesign", *MIS Quarterly,* 23(2), 1999, pp.159-182.

[9] Brown, C.V., and S.L. Magill, "Alignment of the is functions with the enterprise: toward a model of antecedents", *MIS Quarterly,* 18(4), 1994, pp.371-404.

[10] Burn, J.M., and C. Szeto, "A comparison on the views of business and IT management on success factors for strategic alignment", *Information & Management*, 37(4), 2000, pp.197-216.

[11]Burns, T.R., and G.M. Stalker, *The Management of Innovation*, Oxford university press, 1994.

[12]Chakravarthy, B.S., "On tailoring a strategic planning system to its context: some empirical evidence", *Strategic Management Journal*, 8(6), 1987, pp.517-534.

[13]Chan, Y.E., S.L. Huff, D.W. Barclay, D.G. Copeland, "Business Strategic Orientation, Information Systems Strategic Orientation, and Strategic Alignment, " *Information Systems Research*, 8(2), 1997, pp. 125-150.

[14]Chan, Y.E., "Why haven't we mastered alignment? the importance of the informal organization structure", *MIS Quarterly Executive*, 1(21), 2002, pp.76-112.

[15]Chester, A. N., "Aligning technology with business strategy, *Research Technology Management*, 37(1), 1994, pp.25-32.

[16]Crotean, A., and F. Bergeron , F., "An Information Technology trilory：business strategy,technology deployment and organization al performance", **Strategic Information Systems**, 10(2), 2001, pp77-99.

[17]Croteau, A.M., and F. Bergeron, "An information technology trilogy: business strategy, technological deployment and organizational performance", *Journal of Strategic Information Systems*, 37(1), 2001, pp.25-32.

[18]Culnan, M.J., "The Intellectual Development of Management Information Systems, 1972–1982: a Co-citation Analysis", *Management Science*, 32(2), 1986, pp.156–172.

[19]Doherty, N.F., C.G. Marples and A. Suhaimi, "The Relative Success of Alternative Approaches to Strategic Information Systems Planning: an Empirical Analysis, " *Journal of Strategic Information Systems*, 8(3), 1999, pp.263-283.

[20]Earl, M.J., *Management Strategies for Information Technology*, NJ: Prentice-Hall Inc, 1989.

[21]Grant, R.M., "Strategic planning in a turbulent environment: evidence from the oil and gas majors", *Strategic Management Journal*, 24(6), 2003, pp.491-517.

[22]He, Y. and S.C. Hui, "Mining a Web Citation Database for Author Co-citation Analysis, " *Information Processing and Management*, 38(4), 2002, pp.491-508.

[23]Henderson, J.C., "Plugging into Strategic Partnerships: the Critical IS Connection, " *Sloan Management Review*, 31(3), 1990, pp.7-18.

[24]Henderson, J.C. and J.G. Sifonis, "The Value of Strategic IS Planning: Understanding Consistency, Validity, and IS Markets, " *MIS Quarterly*, 12(2), 1988, pp.187-200.

[25]Henderson, J.C. and N. Venkatraman, "Understanding Strategic Alignment, " *Business Quarterly*, 55(3), 1991, pp.72-78.

[26]Henderson, J.C. and N. Venkatraman, *Strategic Alignment: A Model for Organizational Transformation Through Information Technology*, New York: Oxford University Press, 1992.

[27]Henderson, J.C. and N. Venkatraman, "Strategic Alignment: Leveraging Information Technology for Transforming Organizations, " *IBM Systems Journal*, 32(1), 1993, pp.4-16.

[28]Jackson, P.J., "Organizational change and virtual teams: strategic and operational integration", *Information Systems Journal*, 9(4), 1999, pp.313-332.

[29]Johnston, H.R. and S.R. Carrico, "Developing Capabilities to Use Information Strategically, " *MIS Quarterly*, 12(1), 1988, pp.37-48.

[30]Johnston, H.R. and M.R. Vitale, "Creating Competitive Advantage with Interorganizational Information Systems, " *MIS Quarterly*, 12(2), 1988, pp.153-165.

[31]Jordon, E. and B. Tricker, "Information strategy: alignment with organization structure, " *Journal of Strategic Information Systems*, 4(4), 1995, pp.357-382

[32]Karimi, J., Y.P. Gupta, and T.M. Somers, "Impact of competitive strategy and information technology maturity on firms' response to globalization", *Journal of Management Information Systems*, 12(4), 1996, pp.55-88.

[33]Kearns, G.S. and A.L. Lederer, "The Effect of Strategic Alignment on the Use of IS-based Resources for Competitive Advantage, " *Journal of Strategic Information Systems*, 9(4), 2000, pp.265-293.

[34]King, W.R., "Strategic Planning for Management Information Systems, " *MIS Quarterly*, 2(1), 1978, pp.27-37.

[35]King, W.R., and T.S.H. Teo, "Facilitators and inhibitors for the strategic use of information technology", *Information and Management*, 27(2), 1994, pp.71-87.

[36]Konsynski, B.R., "Strategic Control in the Extended Enterprise, " *IBM Systems Journal*, 32(1), 1993, pp.111-142.

[37]Luftman, J.N., P.R. Lewis and S.H. Oldach, "Transforming the Enterprise: The Alignment of Business and Information Technology Strategies, " *IBM Systems Journal*, 32(1), 1993, pp.198-221.

[38]Luo, Y., and S.H. Park, "Strategic alignment and performance of market-seeking MNCs in China", *Strategic Management Journal*, 22(2), 2001, pp.141-155.

[39]McCain, K. W. "Mapping economics through the journal literature: An experiment in journal cocitation analysis." *Journal of the American Society for Information Science*, 42(4), 1991, pp.290-296.

[40]McFarlan, F. W., and J. L. McKenney, *Corporate Information Systems Management: The Issues Facing Senior Executives*. Richard D. Irwin Inc: Homewood, IL, 1983.

[41]McLean, E.R., and J.V. Soden, *Strategic Planning for MIS*, McKinsey and Company, 1977.

[42]Miles, R.E. and C.C. Snow, ***Organizational Strategy, Structure, and Process***, New York: McGraw-Hill, 1978.

[43]Palmer, J.W. and M.L. Markus, "The Performance Impacts of Quick Response and Strategic Alignment in Specialty Retailing, " ***Information Systems Research***, 11(3), 2000, pp.241-259.

[44]Pyburn, P.J., "Linking the MIS Plan with Corporate Strategy: An Exploratory Study" ***MIS Quarterly***, 7(2), 1983, pp.1-14.

[45]Price, D.J.D.S., ***Big Science, Little Science***, New York: Columbia University Press, 1963.

[46]Reich, B.H., and I. Benbasat, "Measuring the linkage between business and information technology objectives", ***MIS Quarterly***, 20(1), 1996, pp.55-81.

[47]Reich, B.H., and I. Benbasat, "Factors that influence the social dimension of alignment between business and information technology objectives", ***MIS Quarterly***, 24(1), 2000, pp.81-113.

[48]Rowlands, I. "Patterns of Author Co-citation in Information Policy: Evidence of Social, Collaborative and Cognitive Structure, " ***Scientometrics***, 44(3), 1999, pp.533-546.

[49]Sabherwal, R. and Y.E. Chan, "Alignment Between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders, " ***Information Systems Research***, 12(1), 2001, pp.11–33.

[50]Sabherwal, R., R. Hirschheim, and T. Goles, "The dynamics of alignment: insights from a punctuated equilibrium model", ***Organization Science***, 12(2), 2001, pp.179-197.

[51]Santhanam, R., and E. Hartono, "Issues in linking information technology capability to firm performance", ***MIS Quarterly,*** 27(1), 2003, pp.125-153.

[52]Segars, A.H. and V. Grover, "Profiles of Strategic Information Systems Planning, " ***Information Systems Research***, 10(3), 1999, pp. 199-232.

[53] Small, H., "Co-citation in the Scientific Literature: a New Measure of the Relationship Between Two Documents, " *Journal of the American Society for Information Science*, 24(4), 1973, pp. 265-269.

[54] Teo, T.S.H. and J.S.K. Ang, "Critical Success Factors in the Alignment of IS Plans with Business Plans, " *International Journal of Information Management*, 19(2), 1999, pp. 173-185.

[55] Teo, T.S.H., and W.R. King, "Integration between business planning and information systems planning: an evolutionary-contingency perspective", *Journal of Management Information Systems*, 14(1), 1997, pp.185-214.

[56] Vanderlee, J.T.M., and B. Dejong, "Alignment is not enough: integrating business and information technology management with the balanced business scorecard", *Journal of Management Information Systems*, 1999, 16(2), pp.137-156.

[57] Venkatraman, N., "Strategic Orientation of Business Enterprises: The Construct, Dimensionality, and Measurement, " *Management Science*, 35(8), 1989, pp. 942-962.

[58] Venkatraman, N., J.C. Henderson, and S. Oldach, "Continuous strategic alignment: exploiting information technology capabilities for competitive success", *European Management Journal,* 1993, 11(2), pp.139-149.

[59] White, H.D. and B.C. Griffith, "Author Co-citation: A Literature Measure of Intellectual Structure, " *Journal of the American Society for Information Science*, 32(3), 1981, pp. 163–171.

[60] White, H.D. "Author Co-citation Analysis: Overview and Defense, " *In Scholarly Communication and Bibliometrics*, Sage: Newbury Park, CA, 1990, pp. 84–106.

[61] White, H.D. "Author Cocitation Analysis and Pearson's r, " *Journal of the American Society for Information Science and Technology*, 54(13), 2003a, pp. 1250–1259.

[62]White, H.D. "Pathfinder Networks and Author Cocitation Analysis: a Remapping of Paradigmatic Information Scientists, " *Journal of the American Society for Information Science and Technology*, 54(5), 2003b, pp. 423–434.

[63]Wiseman, C., *Strategic Information Systems*, McGraw-Hill Professional, 1988.