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Mapping the intellectual Structure of Accounting Standards

Cheng-Hua Wang[1], Yender Lee[2]
Graduate School of Business and Operations Management, Chang Jung Christian University
Tainan,Taiwan, R.O.C.
e-mail: huager@mail.cjcu.edu.tw[1]
yender_lee@yahoo.com[2]

Jen-Hwa Kuo
Graduate School of Business and Operations Management, Chang Jung Christian University
Tainan,Taiwan, R.O.C.
e-mail: dynaopto@gmail.com

Abstract —**The purpose of this paper is to map the intellectual structure of accounting standards and to investigate the key concepts, themes, and their relationships of accounting standards literature in the past two decade. In this study, bibliometric and social network analysis techniques are used to investigate the intellectual pillars of the accounting standards literature. By analyzing 26,273 citations of 1,510 articles published in SSCI journal in accounting standards area between 1990 and 2009. The results of the mapping can help identify the research direction of accounting standards research and provide a valuable tool for researchers to access the literature in this area.**

Keywords-citation; co-citation; accounting standards; IAS; GAAP

I. INTRODUCTION

European IFRS adoption represented a major milestone toward financial reporting convergence yet spurred controversy reaching the highest levels of government [4]. The past two decade has especially seen extensive research on accounting standards. Yet even though accounting standards has established itself as an academic discipline, its establishment has been a slow process because researchers in this area prefer to publish their best work in more established journals. Another major obstacle to the development of accounting standards lies in the subject's unusually high degree of interaction with other disciplines. This overlapping blurs the boundaries of accounting standards and as a result its distinct theoretical model and analytical tools are unjustly attributed to other competing fields. With limited resources contributing to the development of accounting standards, the cross-fertilization of ideas between scholars of accounting standards will be much more difficult to obtain. Consequently, while there is no doubt that there is an area or field of accounting standards, the question remains somehow unclear on what it is, how good its work is, and what are its prospects and needs for future development.

The aim of this study is to provide accounting standards researchers with a unique map to better understand accounting standards related publications and to provide a systematic and objective mapping of different themes and concepts in the development of accounting standards field. This study also attempts to help identify the linkage among different publications and confirm their status and positions in their contribution to the development of accounting standards field. The principal methods used are citation and co-citation analysis, social network analysis, plus a factor analysis which is performed to identify the invisible network of knowledge generation underlying the accounting standards literature.

II. STUDIES OF ACADEMIC LITERATURE

There are a number of techniques that **c**an be used to study a body of literature. Most frequent is the simple literature review where a highly subjective approach is used to structure the earlier work. Objective and quantitative techniques have recently become popular with more databases available online for use. These techniques adopt author citations, co-citations, and systematic review [16] to examine the invisible knowledge network in the communication process by means of written and published works of a given field. These techniques are attractive because they are objective and unobtrusive [11].

Several studies have used the bibliometric techniques to study the literature of management research. For example, Ponzi [17] explored the intellectual structure and interdisciplinary breadth of knowledge management in its early stage of development, using principle component analysis on an author co-citation frequency matrix; Etemad [9] identified the most influential authors and studies in electronic commerce field by using citation analysis; Ramos-Rodriguez and Ruiz-Navarro [18] examined the intellectual structure change of strategic management research by conducting a bibliometric study of the Strategic Management Journal; Acedo and Casillas [1] explored the research paradigms of international management research by applying factorial analysis techniques in an author co-citation study. Chan, Seow and Tam [8] used citations from accounting dissertations completed during 1999-2003 to provide a ranking of accounting journals. To the best of our knowledge, no similar study has been conducted on the current research of knowledge management. Therefore this study aims to fill a gap in knowledge management literature by applying citation and co-citation analysis to a representative sample of recent research on knowledge management collected by the Science Citation Index and

Social Sciences Citation Index.

III. METHODOLOGY

The citation data used in this study included journal articles, authors, publication outlets, publication dates, and cited references. Based on the objective of this study, the authors explored the intellectual structure of accounting standards between 1999 and 2008. This time period was chosen because contemporary accounting standards studies of the last decade represent the most update and probably also the most important research on accounting standards. Citation and co-citation analysis is the main method for this study.. First, the databases were identified as the sources of accounting standards publications. Then data collection and analysis techniques were designed to collect information about topics, authors, and journals on accounting standards research.

In the second stage, the collected data were analyzed and systematized by sorting, screening, summing, sub-totaling, and ranking. After a series of operations, key nodes in the invisible network of knowledge in accounting standards were identified and the structures developed. In the final stage, the co-citation analysis was used and the knowledge network of accounting standards was mapped to describe the knowledge distribution process in accounting standards area.

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

Unlike other prior studies, the data used in this study were not drawn from journals chosen by peer researchers [20]. Instead, the entire databases of SCI and SSCI from 1999 to 2008 served as the universe for analysis. In order to collect the data, we used "key word" method which utilizes the SCI and SSCI databases key word search in article's title and abstract. Using "Accounting standards" as key word, this study collected 1,510 journal articles which further cited 26,273 publications as references. The cited references in these papers included both books and journal articles.

IV. RESULTS

A Citation Analysis

To identify the key publications and scholars that have laid down the ground work of knowledge management research, citation data were tabulated for each of the 1,510 source documents and 22,786 references using the *Excel* package. The citation analysis produced interesting background statistics, as shown in the following tables. Table 1 lists the most cited journals in accounting standards area in the last two decades, among which *Journal of Accounting & Economics, Journal of Accounting Research*, and *The Accounting Review* are the top three most cited journals, followed by *Accounting, Organizations & Society* and *Journal of Finance*. The general pattern of the most cited journals shows that accounting standards research features accounting, finance and economics specific journals.

TABLE1 THE MOST FREQUENTLY CITED JOURNALS: 1999-2008

Journals	Total Citations
Journal of Accounting & Economics	1,217
Journal of Accounting Research	1,203
The Accounting Review	990
Accounting, Organizations & Society	580
Journal of Finance	502
Journal of Financial Economics	473
Contemporary Accounting Research	298
Accounting Horizons	209
Accounting Business	149
European Accounting	136

The most influential documents with the most citation and the most influential scholars were then identified by their total counts of citation within the selected journal articles. As shown in Table 2, the most cited accounting standards publication between 1989 and 1999 (the first decade years) was Watt's book Positive Accounting , followed by Belsley's paper *Regression Diagnostics,* and Miller's paper Accounting and the construction of the governable person (see Table 2). For the second decade years (1999-2008), the first two most cited Accounting standards publications were the same as in the first decade years. The third most cited was Ball's paper The effect of international institutional factors on properties of accounting earnings and Burgstahler's paper Earnings management for avoid earnings decreases and losses and La Porta's paper Law and finance (See Table 3).

TABLE 2 HIGHLY CITED DOCUMENTS: 1989-1998

Total Citations	Full Citation Index For Document
13	Watts R, 1986, Positive Accounting
13	Belsley DA, 1980, Regression Diagnostics
12	Miller P, 1987, Accounting, Organizations & Society, V12, P235
11	Dimaggio PJ, 1983, American Sociological Review, V48, P147
11	White H, 1980, Econometrica, V48, P817
9	Hopwood AG, 1987, Accounting, Organizations & Society, V12, P207
9	Watts RL, 1978, The Accounting Review, V53, P112
8	Meyer JW, 1977, American Journal of Sociology, V83, P340
8	Burchell S, 1980, Accounting, Organizations & Society, V5, P5
8	Burchell S, 1985, Accounting, Organizations & Society, V10, P381

Journal articles and books combined, the top five most

cited scholar between 1989 and 1998 (the first decade years) were Miller, Watts, Hopwood, Edwards, and Meyer (See Table 4). For the second decade years, the status of the most important scholars changed. The top five most cited scholars were Ball, Barth, La Porta, Watts, and Leuz (See Table 5). These scholars have the most influence in the development of accounting standards area and thus collectively define this field. Their contributions represent the focus of the main research in the field and thus give us an indication of the popularity of certain Accounting standards topics as well as their historical values.

TABLE 3 HIGHLY CITED DOCUMENTS: 1999-2008

Total Citations	Full Citation Index For Document
43	Ball R, 2000, Journal of Accounting & Economics, V29, P1
29	Burgstahler D, 1997, Journal of Accounting & Economics, V24, P99
29	La Porta R, 1998, Journal of Political Economy, V106, P1113
27	Bradshaw MT, 2002, Journal of Accounting Research, V40, P41
27	Leuz C, 2003, Journal of Financial Economics, V69, P505
26	Ball R, 2003, Journal of Accounting & Economics, V36, P235
25	White H, 1980, Econometrica, V48, P817
24	Basu S, 1997, Journal of Accounting & Economics, V24, P3
22	Holthausen RW, 2001, Journal of Accounting & Economics, V31, P3
22	Jones JJ, 1991, Journal of Accounting Research, V29, P193
22	Ohlson J, 1995, Contemporary Accounting Research, V11, P661

TABLE 4 HIGHLY CITED AUTHORS:1989-1998

Author	Frequency	Author	Frequency
Miller P	41	Watts R	17
Watts RL	32	Burchell S	16
Hopwood AG	23	Johnson HT	16
Edwards JR	21	Covaleski MA	15
Meyer JW	21	Nobes CW	15
Dimaggio PJ	17		

Although the citation analysis does not eliminate the bias against younger scholars, a paper-based ranking (as in Table 2 & 3) places more emphasis on the quality (as opposed to the quantity) of the documents produced by a given scholar than a ranking of authors based on the frequencies with which a particular author has been cited (as in Table 4 & 5). In addition, Table 2 and 3 represent the key research themes in a field and give us an indication of the popularity of certain Accounting standards topics. The readers can find high citations are associated to what can be termed field-defining titles and they lay down the ground work for the understanding of accounting standards as a distinct phenomenon. A comparison between Table 2 and 3 reveals some interesting patterns from the first decade years (1989-1998) to the second decade years (1999-2008). First, the top two most influential publications in the last decade remain the same, indicating their dominant status for the past decade in accounting standards studies.

The gradual increase in the total citations supports the evolving process of accounting standards research as an academic field and the process of gaining more and more recognition in the literature. On the other hand, the most influential papers in the first decade years and the second decade years do change much. This indicates the development in accounting standards is fast and a few classical works and influential authors still dominate the accounting standards research. More efforts and theoretical breakthrough are thus needed in order to further advance the development of accounting standards research.

TABLE 5 HIGHLY CITED AUTHORS: 1999-2008

Author	Frequency	Author	Frequency
Ball R	170	Dechow PM	83
Barth ME	167	Francis J	73
La Porta R	110	Fama EF	72
Watts RL	96	Miller P	71
Leuz C	90	Lev B	70

B Co-citation Analysis

In this stage, data mapping was conducted and an intellectual structure of current Accounting standards studies was revealed. Co-citation analysis is a bibliometric technique that information scientists use to map the intellectual structure of an academic field. It involves counting documents from a chosen field - paired or co-cited documents. Co-citation analysis compiles co-citation counts in matrix form and statistically scales them to capture a snapshot at a distinct point in time of what is actually a changing and evolving structure of knowledge [19].

Co-citations were tabulated for each source documents by using the *Excel* package. Many of the authors had very few co-citations that were either unlikely to have had a significant impact on the development of the field or were too new to have had time to impact on the literature. To facilitate analyses and improve the probability of its success, it was made sure that all authors in the final set had at least 30 citations in the first ten years and 30 in the second decade years. Based on the total number of citations in the selected journals, the top scholars were identified, and then a co-citation matrix was built before a pictorial map was drawn to describe the correlations among different scholars. In doing so, we were following the procedures recommended by White and Griffith [11].

Social network analysis techniques were used to graph the relationships in the co-citation matrix and identify the strongest links and the core areas of interest in accounting standards [16]. Figure 1 and Figure 2 show the core research themes in Accounting standards studies, based on sampled articles with links of greater than or equal to ten co-citations shown in the network. This is produced using UCINET software [7] and shows graphically the core areas of interest.

Different shapes of the nodes result from performing a faction study of these authors. This method seeks to group elements in a network based on the sharing of common links to each other. The diagrams show that current research in accounting standards area is concentrating on the interactions of essential of value relevance, positive accounting theory, Country-specific factors, and IAS versus U.S. GAAP. The few scholars in Figure 1 and 2 with the most links (co-citation) are the super stars in accounting standards research. Their heavy citations and intensive interlinks with each other undoubtedly indicate their prestigious status in accounting standards research and their publications and research work collectively define the future research directions of accounting standards studies.

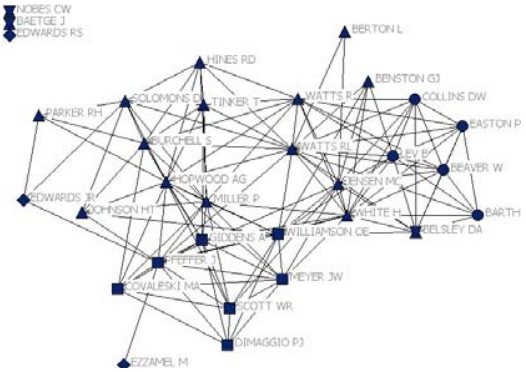

Figure 1 Key Research Themes in Accounting standards (2001-2004) (Frequency≧10)

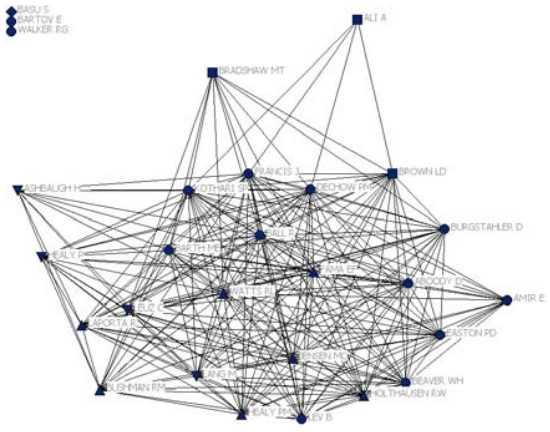

Figure 2 Key Research Themes in Accounting standards (1999-2008) (Frequency≧20)

While the diagrams in Figure 1 and Figure 2 provide a clear picture, their foci are only on the very core areas and only a limited amount of information is revealed. By taking the co-citation matrix and grouping the authors using factor analysis of the correlations between the entries, we can determine which authors are grouped together and therefore share a common element. According to this, the closeness of author points on such maps is algorithmically related to their similarity as perceived by citers. We use r-Pearson as a measure of similarity between author pairs, because it registers the likeness in shape of their co-citation count profiles over all other authors in the set [22].

The co-citation correlation matrix was factor analyzed using varimax rotation, a commonly used procedure, which attempts to fit (or load) the maximum number of authors on the minimum number of factors. The diagonals were considered missing data and were applied the criterion of omitting the two cases [15].

Six factors were extracted from the data in the first decade years (1989-1998) and together they explained over 76% of the variance in the correlation matrix. Table 6 lists the six most important factors along with the authors that had a factor loading of at least 0.5. As is usual in this type of analysis, authors with less than a 0.5 loading or with cross-loadings were dropped from the final results [21]. We tentatively assigned names to the factors on the basis of our own interpretation of the authors with high loadings. Our interpretation of the analysis results is that accounting standards research in this period is composed of at least three different sub-fields: essential of accounting's sociopolitical role, Value relevance, institutionalized organizations, Positive accounting theory, International accounting principles and History of Accounting (Please see Figure 1). We made no attempts to interpret the remaining factors due to their small eigenvalues. They have also been excluded from Table 6.

Similarly, studies on accounting standards also clustered on different research themes between 1999 and 2008 and together they explained over 82% of the variance in the correlation matrix of the second four years, as pictured in Figure 2. Table 7 lists the five most important factors along with the authors that had a factor loading of at least 0.5. We also tentatively assigned names to the factors on the basis of our own interpretation of the authors with high associated loadings. Our interpretation of the analysis results is that accounting standards research at this stage is also composed of at least two key subfields: value relevance, and IAS versus U.S. GAAP.

Figure 1 and Table 6 clearly indicated that the most influential authors in accounting standards studies between 1989 and 1998 clustered together. The first factor in Table 6 appears to define the methodology of accounting research by Hines, Burchell and Hopwood. The various methodologies developed by philosophers of science are relevant to accounting and finance research as organizing, heuristic, and analytical frameworks. If the dangers of scientism can be appreciated by researchers early in the methodological debate within accounting and finance literature, the research may perhaps be saved from the dogmatism and many diversions of resources that have resulted in other fields of inquiry and from an unwarranted reverence for science and the scientific method [12].

Factor 2 is defined by Collins, Beaver and Easton, and appears to represent Value relevance on accounting standards research. Equity values reflect an accounting amount if the two are correlated [5]. Relevance and reliability are the two primary criteria the FASB[10] uses for choosing among accounting alternatives, as specified in its Conceptual Framework. Value relevance as defined in

the academic literature is not a stated criterion of the FASB. Rather, tests of value relevance represent one approach to operationalizing the FASB's stated criteria of relevance and reliability [6].

Factor 3 represents Institutional theory is defined by Meyer, Scott and Dimaggio. Institutional rules may have effects on organizational structures and their implementation in actual technical work which are very different from the effects generated by the networks of social behavior and relationships which compose and surround a given organization [14]. The concepts of institution and institutionalization have been defined in diverse ways, with substantial variation among approaches. Factor 4 represents Positive accounting of accounting standards is defined by Watts, Benston and Berton. Factor 5 represents Country-specific of accounting standards is defined by Noabes, Belsley and Baetge. Factor 6 represents Organizational behavior issues.

TABLE 6 AUTHOR FACTOR LOADINGS: 1989-1998

Factor 1: Methodology of accounting research	**variance**	**Factor 2**: Value relevance	**variance**
Hines RD	0.959	Collins DW	0.927
Burchell S	0.958	Beaver W	0.900
Hopwood AG	0.900	Easton PD	0.890
Tinker T	0.910	Barth ME	0.860
Miller P	0.810	Lev B	0.788
Solomons D	0.767	Watts R	0.590
Johnson HT	0.705	Belsley DA	0.565
Factor 3: Institutional theory	**variance**	**Factor 4:** Positive accounting theory	**variance**
Meyer JW	0.973	Watts RL	0.938
Scott WR	0.966	Benston GJ	0.937
Dimaggio PJ	0.944	Berton L	0.852
Giddens A	0.859	White H	0.689
Pfeffer J	0.773	Jensen MC	0.628
Covaleski MA	0.771	Watts R	0.599
Williamson OE	0.571	Baetge J	0.520
Factor 5: Country-specific	**variance**	**Factor 6:** Organizational behavior	**variance**
Nobes CW	0.651	Edwards RS	0.839
Belsley DA	0.567	Edwards JR	0.795
Baetge J	0.521	Parker RH	0.586
		Johnson HT	0.523

For the second decade years, Figure 2 and Table 7 clearly indicated that the most influential authors in accounting standards studies between 1999 and 2008 also clustered together.

TABLE 7 AUTHOR FACTOR LOADINGS: 1999-2008

Factor 1: Intrinsic value	**variance**	**Factor 2**: IAS versus U.S. GAAP	**variance**
Aboody D	0.839	Fama EF	0.956
Amir E	0.806	La Porta R	0.944
Barth ME	0.800	Watts RL	0.787
Bartov E	0.792	Jensen MC	0.742
Beaver WH	0.786	Healy PM	0.708
Walker RG	0.730	Holthausen RW	0.705
Easton PD	0.709	Bushman RM	0.587
Francis J	0.674	Healy P	0.515
Burgstahler D	0.673		
Lev B	0.662		
Dechow PM	0.599		
Healy PM	0.531		
Holthausen RW	0.528		
Brown LD	0.517		
Collins DW	0.503		
Factor 3: Country-specific	**variance**	**Factor4:** IAS versus Domestic accounting standards	**variance**
Ali A	0.754	Ashbaugh H	0.861
Bradshaw MT	0.746	Leuz C	0.789
Brown LD	0.637	Lang M	0.639
Burgstahler D	0.523	Healy P	0.526
Factor5: Value relevance	**variance**		
Collins DW	0.648		
Kothari SP	0.644		
Basu S	0.607		
Ball R	0.599		
Jensen MC	0.559		

The first factor in Table appears to define the intrinsic value of accounting standards is defined by Aboody, Amir and Barth. Aboody [2](2002) provide strong evidence that conventional value relevance regressions fail to pick up the price effects of information contained in accounting variables that surface in the future. Based on a model that

assumes market price measures intrinsic value with error, in order to measure value relevance with respect to intrinsic value, stock price needs to be adjusted for predictable future price changes that may be driven by this measurement error.

Factor 2 is defined by Fama, La Porta and Watts, and appears to represent IAS versus U.S. GAAP on accounting standards. The IAS versus U.S. GAAP on accounting standards permeates the authors in the second and fourth group. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997)[13] have conjectured that the differences in the nature and effectiveness of financial systems around the world can be traced in part to the differences in investor protections against expropriation by insiders, as reflected by legal rules and the quality of their enforcement.

Factor 3 represents Country-specific of accounting standards is defined by Ale, Brown and Burgstahler. Ali and Hwang (2000)[3] find that value relevance is lower for countries with bank-oriented financial systems a few bands supply most of the capital needs of businesses, whereas in market-oriented financial system numerous diverse investors provide financing. That value relevance is lower for countries where private-sector bodies are not involved in the standard-setting process. Factor 4 represents IAS versus Domestic accounting standards that are defined by Ashbaugh, Leuz and Lang. Factor 6 represents Value relevance issues.

V. CONCLUSION

The past two decades years have seen extensive research on accounting standards. This study investigates accounting standards research using citation and co-citation data published in SCI and SSCI between 1989 and 2008. With a factor analysis of the co-citation data, this study maps the intellectual structure of accounting standards research, which suggests that the contemporary accounting standards research is organized along different concentrations of interests: essential of value relevance, positive accounting theory and IAS versus U.S. GAAP.

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

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