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# On the Research Contribution of XBRL Literature - A Bibliometrics Analysis

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## *Abstract*

*The purpose of this study is to investigate the research attributes and contribution of extensible Business Reporting Language (XBRL) literature in the past decade by employing bibliometrics analysis. Publications on XBRL topical area are used to complete two sections of analysis in this study. The first section examines the research intellectual network of XBRL by applying citation frequency count and co-citation analysis. The second section examines the content of XBRL publications by taxonomizing articles along multiple dimensions and providing descriptive statistics on research attributes. This study aims at contributing to accounting literature by shedding light on the recent research structure on XBRL and potential future directions.*

***Keywords:*** *XBRL, Extensible Business Reporting Language, Bibliometric Analysis, Co-Citation**.***

***JEL Code Classification:*** *M40, M41, M42*

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## 1. Introduction

The study aims at examining the research interaction network and research attributes of extensible Business Reporting Language (hereafter XBRL)in the past decade. XBRL, a reporting system that accommodates financial statements across companies, industries, and countries by standardizing tags of XML type (Richards et al. 2004). Initiated by Charles Hoffman, the concept of XBRL was carried out by the American Institute of Certified Public Accountant as XBRL International. Academic research in XBRL (e.g. Debreceny and Gray 2001, Bovee et al 2002, and Farewell 2006)is a relatively young and yet developing area since the late 90s as oppose to the research streams that has been more intensively explored and developed for a few decades in accounting discipline (e.g. accruals anomaly, agency theory, earnings management…etc). Tracing back the contribution in research periodically enables both academician and practitioners to review the recent achievement and development in a field and shed light on future paths. Aiming at this line of contribution, this study examines the research intellectual structure and characteristics of XBRL research by addressing three main research questions: 1) The emergence of XBRL research: what are the earlier groups of research that triggered the birth of this area and lead to its development? 2) The structure of XBRL research: how are the intellectual research groups linked to one another? And 3) The attributes of XBRL research: what are the identified characteristics of XBRL research (e.g. article research methods applied, topical issues addressed…etc).

In examining the three aforementioned research questions, this study applies both co-citation and content analysis techniques. The earlier research groups that formed and evolved into XBRL research as well as the many dimensions of research attributes of this literature stream are identified in this article. Results also imply that XBRL literature has potential to provide critical progress on standardizing accounting reports across countries in many aspects in the future. The remaining of this study is structured as follows, the next section reviews the concept of XBRL in the literature and the motivation of this study; the third and fourth sections illustrate methodology application and results analysis. The last section concludes the study with a summary of findings, limitations and implications.

## 2. Literature Review

### 2.1. Literature Review on XBRL- Concept and Research Development

As technology advances and information transparency gains its importance over time, the necessity of applying unified language to interpret a wide variety of information, including financial statements has surfaced and triggered the development of the unified tagging language. XBRL, a subset of XML, has been created to facilitate the understanding of financial statements worldwide. Research in this realm thus far has expanded on topics regarding, e.g., XBRL taxonomy itself, the understanding of XBRL in education institutions, the assurance integrity of XBRL,

the application and overall impact of XBRL and/or XML, the comparison of XBRL with other online financial reporting schemes, as well as issues on voluntary disclosure and knowledge transfer. In addition, there exist studies that contribute to bridging XBRL with auditing issues, such as continuous auditing and fraud detection.

The critical advantages and/or attributes of XBRL are known by its ability to increase the speed of sharing information with a lower cost and its improvement of information accuracy. XBRL enable both users and intelligent software to operate on disseminating financial information through the internet with a higher degree of accuracy and reliability (Debreceny and Gray 2001, Farewell 2006). After the initiative of XBRL by AICPA, Debreceny and Gray (2001) studied the usage and development of XBRL along with its various aspects of future research opportunities including database accounting, financial statement assurance, intelligent agents, new taxonomies, adoption incentives, new taxonomies…etc. The study acknowledges XBRL standards as a comprehensive mechanism that report relatively traditional information sets on the Internet and considers this advancement as incremental rather than revolutionary. Farewell (2006) used technical assignments and research to investigate the understanding of XBRL within academia. The study concluded by reemphasizing the importance and benefits of XBRL, e.g. it reduces the need of re-keying information, enables paper-less data exchange by downloading information as computer ready format from the internet, allows for differences among industries through the use of custom taxonomies and does not require additional software or new reporting standards.

## 2.2. Literature Review on Bibliometrics- Citation, Co-citation and Publication Analysis

Bibliometrics, including citation analysis, co-citation analysis and publication analysis methods have been employed in accounting research to evaluate and analyze the knowledge structure as well as the attributes of accounting studies (McRae 1974, Hofstedt 1976, Brown et al. 1987, Bricker, Bricker 1989, Reiter and Williams 2002). Research in accounting has been using bibliometrics methods for various aspects of examination; however, limited studies have adopted this technique for analyzing the contribution and impact of XBRL research on accounting field which allows us to provide contribution in this relatively new area of research. Specifically, this study focuses on citations and co-citations analysis to shed light on the influence of XBRL literature on accounting research and also investigate the communication networks of XBRL research.

## 2.3. Research Network Interaction- Citation and Co-citation Techniques

Citation analysis has been applied to accounting research for nearly three decades (McRae 1974, Dyckman and Zeff 1984, and Brown and Gardner 1985). Originated in the natural and social sciences discipline (Garfield, 1972), this quantitative method evaluates literature in different disciplines (Osareh 1996) and the assumption that underlies the method is that frequently cited articles are likely to have higher

influence than less cited articles (Culnan 1986). Garfield (1972) stated that citation frequency of a journal is a function not only of the scientific significance of the material it publishes but also of the amount of material it publishes. Citations in academic articles give us a measure of the number of formal messages passed between knowledge systems and also provide a possible index for measuring the influence of one knowledge system on another (McRae 1974).

Studies have adopted this method to measure the influence of accounting research on other fields and also the impact of certain subareas on other subareas in one particular research realm. MacRae (1974) examined the information flow between accounting research network and also within accounting network and other disciplines by adopting citation analysis method for publication in years 1968 and 1969 for 17 accounting journals. Results in this study suggested that accounting knowledge system is relatively open to outside influences but demonstrates little influence on the social science discipline.

Citation analysis has been adopted to measure certain academic journals' influence on which field as well. Dyckman and Zeff (1984) adopted a variety of forms of citation analysis to measure the impact of *Journal of Accounting Research*(JAR) over 20 years. They found that JAR has improved the integration of accounting ideas and methods drawn from other disciplines and established a premier role in empirical research tradition in accounting with focuses on capital markets and behavior work. Brown and Gardner (1985) applied citation analysis to evaluate the research contributions of accounting faculty and doctoral programs for four accounting academic journals within 1976-1982. In total, 4948 citations of 1574 articles authored and coauthored by 712 accounting researchers are collected. They evaluated the influence of articles by measuring the total citations and indicated that citation analysis can be employed to measure the impact of journals, individuals, faculties, and graduate programs on accounting research.

Co-citation technique examines the interaction and communication within certain research networks to provide historical aspects of the intellectual structure that gives further useful insights on how the field views itself (McCain 1986, 1990, White and Griffith, 1981, Noel et al. 2003).In academic discipline, researchers tend to cluster into informal networks and focus on common problems in common ways, the informal network is also called "invisible colleges" (Price 1963). Co-citation analysis method offers various aspects of research, e.g. the growth of citations over time, how its popularity processed over time, whether an article is still considered useful for research currently and identifies when major articles were written.

Developed in the 1970s (Small 1973, Small and Griffith 1974, Griffith et al. 1974), co-citation analysis technique assist on investigating the structure of scholarly disciplines and their specialties. This method was first applied in the accounting research area by Gamble and O'Doherty (1985) Bricker (1989), however, literature in this branch of research is yet under development. Bricker (1989) studied citation and co-citation clustering analysis techniques to examine a disciplinary structure of

accounting research, the inferred evidence of structure for fragmentation and integration evidence in accounting discipline, and also the breadth of topic coverage of accounting research by accounting journals. This study found that substantial amount of cluster nesting indicates that some accounting research areas are relatively well integrated, e.g. the financial cluster- positive accounting, market-based, and time-series research; a moderate degree of nesting was found in managerial and HIP/behavioral studies; and a low degree of nesting found in forecasting bankruptcy and income theory literature.

## 2.4. Research Attributes and Trend- Publication Analysis

Along with citation and co-citation analysis techniques, publication analysis is another main bibliometrics that has been applied in accounting research field over two decades. As the advancement and dissemination of knowledge is often communicated through journals and books within the academic discipline, publication analysis aims at shedding light on the characteristics and dimensions of academic studies, as well as research evolution in a discipline by focusing on a certain sets of articles and/or journals within the time frame for research. The following provide a review of articles that analyzes accounting literature attributes along the year of within a specific set of accounting publications. Brown and Gardner (1985) studied the contributions and impact of four main accounting research outlets on contemporary accounting research, the journals include *The Accounting Review, Journal of Accounting Research, Journal of Accounting and Economics, and Accounting, Organizations, and Society.*

Another study by Brown et al. (1987) applied both publication analysis and citation analysis to investigate research contributions in *Accounting, Organizations and Society (AOS)* within 1976 and 1984 which showed that the journal has successfully meet its aims and scope and served as a complement outlet for research involving international, behavioral, organizational and social aspects of accounting. Vasarhelyi et al. (1988) studied accounting research trend within 1963 and 1984 by investigating several dominant taxonomies including research method, mode of reasoning, foundation discipline, and school of thought after categorizing and analyzing studies published in *The Accounting Review, Journal of Accounting Research, Journal of Accounting, Auditing, and Finance, Auditing- A Journal of Theory and Practice, and Accounting, Organizations, and Society*. Their findings suggest that since 1976, research in accounting drawn its theory from economics and psychology at most and the significant increasing trends occurs at the behavioral, statistical modeling, archival, empirical, and quantitative studies since 1963.

The second part of this study aims at performing publication analysis on the dimensions and characteristics of XBRL literature over the past decade within the academic discipline in attempt to reveal the research attributes and contribution that has been achieved thus far.

## 3. Methodology

### 3.1. Sample Collection- Articles on XBRL

The collected data for this study are the publications in academic journals that are relevant to issues on XBRL. The academic publications are collected by searching through online databases including ***EBSCOHost, ISI Knowledge Web, Science Direct, and Social Science Research Network (SSRN)***. In terms of the query process, we first search by the key words "XBRL" and "Extensive Business Reporting Language" in each of the databases, the full article are then downloaded individually and outputted to excel files. In the first attempt, the sample size of collected XBRL relevant articles is 55. However, after a manual review process there are six studies excluded from the original sample. There exist two duplicate articles collected from SSRN source as those working papers yet remain in SSRN database after being published in academic journals. In addition, we exclude the one book review article and one professional article retrieved from EBSCOHost since our study focuses on addressing the knowledge network and attributes of academic XBRL publication. Lastly, an article each from ISI and SSRN are found lacking the match with the remaining sample and the purpose of this study as their main content relates fairly little to XBRL but simply mentions XBRL within the article. After excluding the aforementioned studies, the final sample contains 49 XBRL articles retrieved from four databases with 12 from EBSCHost, 6 from ISI Knowledge Web, 9 from Science Direct, and 22 from Social Science Research Network (Table1).

### 3.2. Citations and Co-citation Collection

To determine the proximity of XBRL publications and its academic network, co-citation analysis is carried out in the first part of the study as follows. After downloading the 49articles, besides those collected from ISI knowledge website that allows us to automatically output references, the remaining articles' references were either pasted or typed into excel manually References are sorted and coded by abstracting the author names and titles. Collected raw references from the 49 XBRL articles include 1606 in total, which includes a variety of citation types of not only academic publications but also professional journals, standard boards, websites, regulation associations…etc. As the research objective is on addressing the interaction network among academic research itself, the references used for analysis is limited to publications in academic journals as well as books, excluding citations from e.g. standard and regulation boards.

The citation frequency for each coded references from the XBRL articles is then computed by excel pivot table. The next step is to compute co-cited counts which determine the academic networking strength and interaction among publications. As XBRL is a branch relatively new in accounting research discipline, this study applies two as the citation frequency threshold for differentiating significant referenced studies. In other words, co-citation analysis is performed only for the references that have been cited more than twice. Applying this threshold provides

us a list of the 40 most cited references with the frequency ranging within 3 to 13 times among the 48 XBRL articles (Table 2).

**Table 1. XBRL Articles Source Information and Statistics**

| Database Source | Number of Articles |
|---|---|
| Ebscohost | 12 |
| ISI | 6 |
| ScienceDirect | 9 |
| Social Science Research Network (SSRN) | 22 |
| **Total (articles)** | **49** |

| Initials | Articles Published Journal (24 journals) | Number of Articles |
|---|---|---|
| AH | Accounting Horizons | 1 |
| CACM | Communications of the ACM | 1 |
| CAP | Canadian Accounting Perspectives | 1 |
| CJAS | Canadian Journal of Administrative Sciences | 1 |
| CPI | Computer Standards & Interfaces | 1 |
| EAR | European Accounting Review | 1 |
| IAE | Issues in Accounting Education | 1 |
| IJAIS | International Journal of Accounting Information Systems | 6 |
| IJB | International Journal of Business | 1 |
| IJIM | International Journal of Information Management | 1 |
| IMDS | Industrial Management & Data Systems | 1 |
| IS | Information Systems | 1 |
| JAPP | Journal of Accounting and Public Policy | 2 |
| JBR | Journal of Business Research | 1 |
| JETA | Journal of Emerging Technology in Accounting | 2 |
| JIS | Journal of Information Systems | 5 |
| OIR | Online Information Review | 1 |
| QF | Quantitative Finance | 1 |
| RBIS | Review of Business Information Systems | 1 |
| SBR | Schmalenbach Business Review | 1 |
| TAR | The Accounting Review | 1 |
| WI | Wirtschaftsinformatik | 2 |
| Working Papers | | 15 |
| **Total Articles** | | **49** |

## Table 2: The 40 Most Cited References

| 40 Most Cited References | Cited Frequency Counts |
|---|---|
| DEBRECENY RS-2001-IJAIS-V2 | 13 |
| BOVEE M-2002-JIS-V16 | 11 |
| HODGE FD-2004-TAR-V79 | 11 |
| BOVEE M-2005-JIS-V19 | 8 |
| DEBRECENY RS-2005-FINANCIAL REPORTING IN XBRL | 8 |
| CHOU KH-2006-HOW VALID ARE THEY | 6 |
| DEBRECENY RS-2002-JAPP-V21 | 6 |
| DEBRECENY RS-2005-JIS-V19 | 6 |
| HOFFMAN C-2001-XBRL ESSENTIALS | 6 |
| BALDWIN AA-2006-JETA-V3 | 5 |
| BEATTIE V-2003-TBAR-V35 | 5 |
| BORITZ JE-2008-AUDITING AN XBRL | 5 |
| BORITZ JE-2008-SEC's XBRL VOLUNTARY | 5 |
| ETTREDGE M-2001-IJAIS-V2 | 5 |
| LYMER A-1999-BUSINESS REPORTING-IASC | 5 |
| PLUMLEE RD-2008-AH-V22 | 5 |
| BORITZ JE-2003-ASSURANCE REPORTING FOR XBRL | 4 |
| BORITZ JE-2004-CAP-V3 | 4 |
| COHEN E-2003-THE IMPLICATIONS OF ECONOMIC | 4 |
| ECCLES RG-2001-THE VALUEREPORTING REVOLUTION | 4 |
| RAHM E-2001-VLDBJ-V10 | 4 |
| WALLMAN SMH-1997-AH-V11 | 4 |
| WEBER RA-2003-XML XBRL AND THE FUTURE | 4 |
| BORITZ JE-2005-JAPP-V24 | 3 |
| CHANG C-2005-EM-V15 | 3 |
| COFFIN Z-2001-SF-V82 | 3 |
| DEBRECENY RS-1999-EAR-V8 | 3 |
| ELLIOTT RK-2002-AAJPT-V21 | 3 |
| ETTREDGE M-2002-JAPP-V21 | 3 |
| FAREWELL S-2005-CPAJ-V75 | 3 |
| HUNTON JA-2003-THE SUPPLY AND DEMAND | 3 |
| JONES MJ-2004-AF0R-V28 | 3 |
| KERNAN K-2008-JA-V206 | 3 |
| LYMER A-2003-IJA-V7 | 3 |
| MURTHY US-2004-IJAIS-V5 | 3 |
| PINSKER R-2008-CACM-V51 | 3 |
| PREMUROSO RF-2008-IJAIS-V9 | 3 |
| TRITES GD-1999-THE IMPACT OF TECHNOLOGY | 3 |
| WILLIAMS SP-2006-IJIM-V26 | 3 |
| YIN RK-1994-CASE STUDY RESEARCH | 3 |

Notice that several XBRL articles stood out with references that does not have co-citations with other sampled articles and therefore were excluded from the co-citation analysis section given that it fails to provide the networking and interaction structure that this section is aiming at. However, the full sample of 53 articles all

qualifies for the second phase of analysis which examines the attributes and research contribution of XBRL literature.

The co-citation frequencies provides the basis for structuring the co-citation matrix which has its main column (most left) and row (most top)listing the sampled XBRL articles' title and cells in the middle demonstrating the relationship significance after computing the co-cite count by applying the following formula from prior literature (cites).

Co-Citation Count Formula (cites/explanation):

$$CoCit_{AB} = \frac{(co-citation_{AB})^2}{Minimum(citation_A; citation_B) \times mean(citation_A; citation_B)}$$

The co-citation matrix in excel are and outputted to the ORA software that assists the investigation of knowledge structure and research groups existing within XBRL literature as well as visualize the status of the research network.

### 3.3. Publication Analysis- A Taxonomy of Research Attributes

The second section of this study focuses on the dimensions and attributes of XBRL research. A great amount of literature has performed publication analysis (i.e. Brown et al. 1987 and Vasarhelyi et al. 1988) which typically categorizes journal publications along a developed or newly created taxonomy with various dimensions to reveal article attributes. Specifically, this part of the analysis aims at capturing the topical area of XBRL literature as well as its adopted research methods, reasoning mode, geography focus, and accounting area of research contribution (Table 3).

By studying the collected XBRL articles, familiarizing with current XBRL research dimensions as well as referring to the accounting research taxonomy developed by Brown et al. (1984) in the ***Accounting Research Directory***, this study creates a XBRL research taxonomy in attempt to not only reveal the characteristics of collected publications but also potentially shed light on the directions of XBRL research development. Articles have been manually downloaded and classified along the taxonomy manually. The statistics analysis on the attributes rankings, frequency and percentage counts are carried out in excel. The description of the five main categories of the developed taxonomy (research methodology, reasoning mode, topical area, accounting area, and geography focus) is detailed as follows.

There search technique the article adopts to address its research question is identified by the research methodology category. This category contains four subcategories: theoretical/analytical archival, empirical, and opinion survey. Reasoning mode categorizes articles by either quantitative or qualitative type. Topical area identifies the main content or theme that relates to the XBRL study which breaks down to nine subcategories including XBRL taxonomy, education, and assurance integrity, other online financial reporting schemes, continuous auditing,

fraud detection, impact and application of XBRL/XML, voluntary disclosure, and knowledge transfer and sharing.

**Table 3. A Taxonomy of XBRL Publication Attributes**

| |
|---|
| • **Research Methodology** |
| o Theoretical/Analytical |
| o Archival |
| • Primary |
| • Secondary |
| o Empirical |
| o Lab |
| o Case |
| o Opinion Survey |
| • **Reasoning Mode** |
| o Quantitative |
| o Qualitative |
| • **Topical Area** |
| o XBRL-FR and GL Taxonomies |
| o XBRL-Education |
| o XBRL-Assurance-Integrity |
| o Online-Internet Reporting (Financial Reporting) |
| o Continuous Auditing |
| o Fraud Detection |
| o Impact and application of XBRL/XML |
| o Voluntary Disclosure |
| o Knowledge Transfer and Sharing |
| • **Accounting Area** |
| o Financial |
| o Auditing |
| o Managerial |
| o Mixed |
| o Environmental Accounting |
| • **Geography Focus** |
| o USA |
| o Europe |
| o Australia |
| o Asia |
| o Mixed |

The area in accounting research that the publication contributes most to is identified by the accounting area taxon. This category includes financial, auditing, managerial, environmental accounting and mixed (when more than one accounting area is identified). Geography focus reveals the geographic area where the study researched on. The subcategories include US, Europe, Australia, Asia, and mixed (when no specific geographic area can be identified).

## 4. Results Analysis

### 4.1. Citations, Co-citations, and Co-Citation Matrix

After collecting references from the 49 XBRL articles and prior to performing co-citation analysis, there are three articles that do not qualify to perform co-citation analysis including Angel (2009), Schwalm (2004) and Swanson (2010). References from both Angel (2009) and Schwalm (2004) does not duplicate with others, in other words, there exist no co-cites between either Angel (2009) and Schwalm (2004) and the remaining references. Swanson (2010) contains only citations from regulatory boards which also does not meet the needs in the study and therefore are excluded from the analysis.

Acknowledging that research on XBRL is considered a rather new research area in accounting field which emerged since the late 90s', we apply two co-citation counts as the threshold of significance for evaluating influential XBRL citations. That is, the references included and proceed to perform co-citation analysis in the co-citation matrix are those that are co-cited more than twice. After calculating the co-citation counts, the final sample available to be carried out for co-citation analysis include 48 XBRL related studies in total with the exclusion of five articles that are either error from the collection of non-academic publication or contains citations that are not co-cited by another article for more than twice.

The co-citation counts are then normalized and transformed into co-citation rates to determine the proximity of the citations.

## Table 4. Co-Citation Matrix (partial example)

| | | BALDWIN AA-2006-JETA-V3 | BEATTIE V-2003-TBAR-V35 | BORITZ JE-2003-ASSURANCE REPORTING FOR XBRL | BORITZ JE-2004-CAP-V3 | BORITZ JE-2005-JAPP-V24 | BORITZ JE-2008-AUDITING AN XBRL | BORITZ JE-2008-SEC's XBRL VOLUNTARY | BOVEE M-2002-JIS-V16 | BOVEE M-2005-JIS-V19 | CHANG C-2005-EM-V15 | CHOU KH-2006-HOW VALID ARE THEY | COFFIN Z-2001-SF-V82 | COHEN E-2003-THE IMPLICATIONS OF ECONOMIC | DEBRECENY RS-1999-EAR-V8 | DEBRECENY RS-2001-IJAIS-V2 | DEBRECENY RS-2002-JAPP-V21 | DEBRECENY RS-2005-FINANCIAL REPORTING IN XBRL | DEBRECENY RS-2005-JIS-V19 | ECCLES RG-2001-THE VALUEREPORTING REVOLUTION | ELLIOTT RK-2002-AAJPT-V21 | ETTREDGE M-2001-IJAIS-V2 | ETTREDGE M-2002-JAPP-V21 | FAREWELL S-2005-CPAJ-V75 | HODGE FD-2004-TAR-V79 | HOFFMAN C-2001-XBRL ESSENTIALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 11 | 8 | 3 | 6 | 3 | 4 | 3 | 13 | 6 | 8 | 6 | 4 | 3 | 5 | 3 | 3 | 11 | 6 |
| BALDWIN AA-2006-JETA-V3 | 5 | 1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.4 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BEATTIE V-2003-TBAR-V35 | 5 | 0.2 | 1 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.1 | 0.0 | 0.0 |
| BORITZ JE-2003-ASSURANCE REPORTI | 4 | 0.0 | 0.0 | 1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| BORITZ JE-2004-CAP-V3 | 4 | 0.0 | 0.2 | 0.0 | 1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.5 | 0.0 | 0.2 | 0.0 | 0.1 | 0.2 | 0.1 | 0.4 | 0.0 | 0.2 |
| BORITZ JE-2005-JAPP-V24 | 3 | 0.1 | 0.1 | 0.0 | 0.1 | 1 | 0.0 | 0.0 | 0.4 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| BORITZ JE-2008-AUDITING AN XBRL | 5 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| BORITZ JE-2008-SEC's XBRL VOLUNTA | 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 1 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BOVEE M-2002-JIS-V16 | 11 | 0.1 | 0.4 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 1 | 0.3 | 0.2 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 |
| BOVEE M-2005-JIS-V19 | 8 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 1 | 0.2 | 0.0 | 0.2 | 0.4 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| CHANG C-2005-EM-V15 | 3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.2 | 1 | 0.0 | 0.4 | 0.1 | 0.0 | 0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CHOU KH-2006-HOW VALID ARE THEY | 6 | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | 0.3 | 0.6 | 0.0 | 0.0 | 0.0 | 1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| COFFIN Z-2001-SF-V82 | 3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.2 | 0.4 | 0.0 | 1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| COHEN E-2003-THE IMPLICATIONS OF | 4 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.4 | 0.1 | 0.1 | 0.1 | 1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.0 |
| DEBRECENY RS-1999-EAR-V8 | 3 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 | 0.4 | 0.3 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| DEBRECENY RS-2001-IJAIS-V2 | 13 | 0.4 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.0 | 0.2 | 0.1 | 0.4 | 1 | 0.1 | 0.0 | 0.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| DEBRECENY RS-2002-JAPP-V21 | 6 | 0.0 | 0.3 | 0.0 | 0.5 | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.1 | 1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.6 | 0.3 | 0.1 | 0.0 | 0.0 |
| DEBRECENY RS-2005-FINANCIAL REPO | 8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| DEBRECENY RS-2005-JIS-V19 | 6 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.2 | 0.0 | 0.3 | 0.1 | 0.0 | 1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.0 |
| ECCLES RG-2001-THE VALUEREPORTIN | 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| ELLIOTT RK-2002-AAJPT-V21 | 3 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 |
| ETTREDGE M-2001-IJAIS-V2 | 5 | 0.0 | 0.4 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.1 | 1 | 0.0 | 0.1 | 0.0 | 0.0 |
| ETTREDGE M-2002-JAPP-V21 | 3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 1 | 0.0 | 0.0 | 0.0 |
| FAREWELL S-2005-CPAJ-V75 | 3 | 0.0 | 0.1 | 0.0 | 0.4 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 1 | 0.0 | 0.1 |
| HODGE FD-2004-TAR-V79 | 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 | 0.0 |
| HOFFMAN C-2001-XBRL ESSENTIALS | 6 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 1 |

### 4.2. Visualizing XBRL Academic Research Network

After calculating co-citation counts and setting up co-citation matrix, the data from excel imputed into ORA to visualize the networks.

**Figure 1: Original Co-Citation Network**

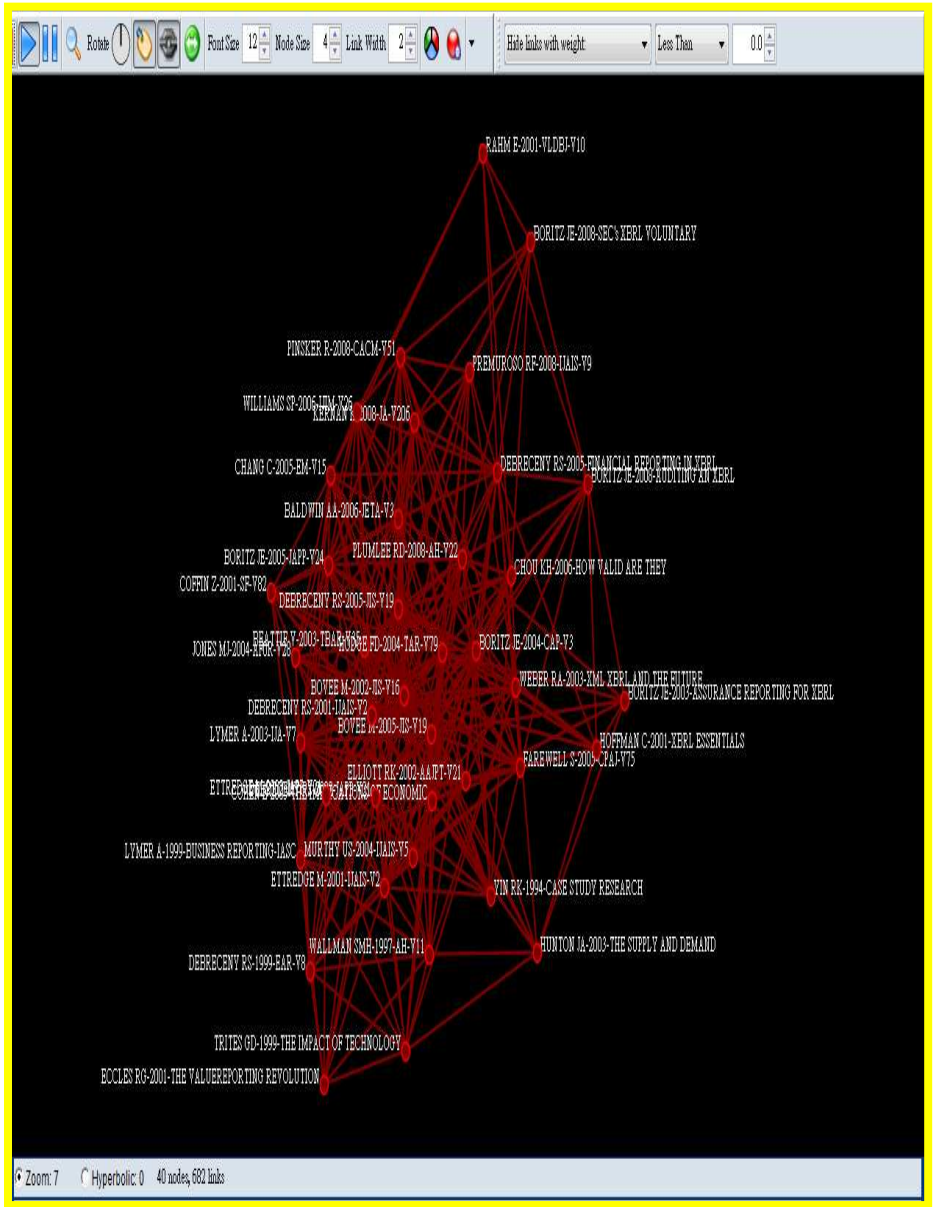

**Figure 2: 0.33 Threshold applied Co-citations Network**


### 4.3. Publication Analysis- Attributes and Knowledge Groups

The results of the classification of XBRL articles by the developed taxonomy demonstrate the developed characteristics and contribution of this research area by far.

## 5. Conclusions and Implications

This study utilizes bibliometrics to analyze the contribution of XBRL literature in the accounting academic area. The purpose is to evaluate how the XBRL literature impacts the overall accounting research and whether its research involves

interactions with academic areas other than accounting in the past decade. The sampled 49 academic articles on XBRL topic were hand collected via online publication databases and their references were output for citation and co-citation analysis. In comparison with other review studies or bibliometrics analysis studies in accounting area, this study utilizes a relatively small sample. However, this seemingly limitation is due to the fact that XBRL concept has only been introduced and developed ever since 1998 and academic research in this area is yet prospering in various aspects up to date.

## References

Badua, F.A. (2005). Pondering Paradigms: Tracing the Development of Accounting Thought with Taxonomic and Citation Analysis (Ph.D. Dissertation, Rutgers University).

BoveeM., M.L. Ettredge, R.P. Srivastava, M.A. Vasarhelyi. (2002). Does the Year 2000 XBRL Taxonomy Accommodate Current Business Financial-Reporting Practice? *Journal of Information Systems.* 16 (2): 165-182.

Bricker, R.(1989).An Empirical Investigation of the Structure of Accounting Research.*Journal of Accounting Research.* 27(2): 246-262.

Brown, L.D. and J.C. Gardner (1985a).Using Citation Analysis to Assess the Impact of Journals and Articles on Contemporary Accounting Research (CAR).*Journal of Accounting Research.* 23(1): 84-109.

Brown, L.D. and J. C. Gardner (1985b).Applying Citation Analysis to Evaluate the Research Contributions of Accounting Faculty and Doctoral Programs. *TheAccounting Review.*60(2): 262.

Brown, L.D., J.C. Gardner, and M.A. Vasarhelyi (1987). An analysis of the research contributions of Accounting, Organizations and Society, 1976-1984. *Accounting, Organizations and Society.* 12(2): 193-204.

Brown, L.D., J.C. Gardner, M.A. Vasarhelyi (1993). Accounting Research Directory: The Database of Accounting Literature. Princeton, M. Wiener.

Debreceny, R. and G.L., Gray (2001). The Production and use of semantically rich accounting reports on the Internet: XML and XBRL. *International Journal of Accounting Information Systems.*2 (1) 47-74.

Dyckman, T.R. and S.A. Zeff (1984). Two Decades of the Journal of Accounting Research. *Journal of Accounting Research*.22 (1): 225-297.

Farewell, S.M. (2006).An Introduction to XBRL through the Use of Research and Technical Assignments. *Journal of Information Systems* 20 (1): 161-185.

Garfield, E.(1972). Citation Analysis as a Tool in Journal Evaluation. *Essays of an Information Scientist.* 1: 527-544.

Griffith, B.C., H.G. Small, J.A. Stonehill, and D. Sandra(1974). The Structure of Scientific Literatures II: Toward a Macro- and Microstructure for Science. *Science Studies*. 4: 339-365.

Hofstedt, T.R.(1976). Behavioral accounting research: Pathologies, paradigms and prescriptions. *Accounting, Organizations and Society*. 1 (1): 43-58.

McCain, K.W. (1986). Cocited Author Mapping as a Valid Representation of Intellectual Structure. *Journal of the American Society for Information Science* 37(3): 111-122.

McCain, K.W. (1990). Mapping Authors in Intellectual Space: A Technical Overview. *Journal of the American Society for Information Science* 41(6): 433-443.

McRae, T.W. (1974). A Citation Analysis of the Accounting Information Network. *Journal of Accounting Research* 12(1): 80-92.

Noel, S., C,-H. H. Chu and V. Raghavan(2003). Co-Citation Count vs Correlation for Influence Network Visualization. *Information Visualization.*1-11

Osareh, F. (1996a). Bibliometrics, Citation Analysis and Co-Citation Analysis - Part I. *Libri* 46(3): 149-158.

Osareh, F. (1996b). Bibliometrics, Citation Analysis and Co-Citation Analysis - Part II.*Libri*46(3): 217-225.

Price, D.(1963).Big Science, Little Science, Columbia University Press, New York.

Reiter, S.A. and P.F. Williams (2002). The Structure and Progressivity of Accounting Research: The Crisis in the Academy Revisited. *Accounting, Organization and Society*.27: 575-607.

Richards, J., B. Smith, and A. Saeedi (2004). An Introduction to XBRL. *Working Paper.*

Small, H. (1973). 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): 265-269.

Small, H. and B.C. Griffith (1974). The Structure of Scientific Literatures I: Identifying and Graphing Specialties. 4: 17-40.

Gamble, G.O. and B. O'Doherty (1985). Citation Indexing and Its Uses in Accounting: An Awareness Survey and Departmental Ranking. *Issues in Accounting Education*. 3:28-41.

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

Vasarhelyi, M. A. and J. Berk (1984).The Multiple Taxonomies of Accounting Research. *Working Paper*, Columbia University.

Vasarhelyi, M.A. and D.H. Bao (1988).Trends in the Evolution of Scholarly Accounting Thought: A Quantitative Examination. *The Accounting Historians Journal*. 15 (1): 45-64.