Analysis of XBRL Literature: A Decade of Progress and Puzzle

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Abstract. XBRL (eXtensible Business Reporting language) was recently, in 2008, in its 10th year. The concept was articulated in 1998 by Charles Hoffman, known as XFRML (eXtensible Financial Reporting Mark Up Language) to facilitate the business reporting process and improve financial reporting. The objective of this paper is to examine a decade (1998-2008) of XBRL articles published in various publications including trade, practitioner and academic journals to identify trends and patterns, milestones, and organizations actively contributed to this development. Another goal is to assess public perceptions of XBRL, its capabilities and its future. We examined published articles where XBRL appeared either in the title or abstract of the article during 1998-2008. Considering that XBRL reporting is being required only in recent years, the research shows various interest groups worked together for a long time to achieve a common goal. The academic community has also been proactive in contributing to and assessing this new reporting standard. There is a trail of research articles to document this contribution. This paper provides various charts and interesting statistics.

Keywords: XBRL, Accounting, Assurance of XBRL, XBRL software, XBRL GL, SBR, Big Four

1. INTRODUCTION

XBRL (eXtensible Business Reporting language) was recently, in 2008, in its 10th year. The concept was articulated in 1998 by Charles Hoffman, and then known as XFRML (eXtensible Financial Reporting Mark Up Language). XBRL is new a business reporting standard that is developed by an international consortium to communicate

financial information over the web faster, easier, and more reliable. As such XBRL provides both users of financial information and stock markets regulators with timely information and also information transparency. The objective of this paper is to examine a decade (1998-2008) of XBRL articles published in various publications including trade, practitioner and academic journals to identify trends and patterns, milestones, and organizations actively contributed. Another goal is to assess public perceptions of XBRL, its capabilities and its future. We examined published articles where XBRL appeared either in the title or abstract of the article during 1998-2008.

To answer above questions a review of the literature was performed to gain a more thorough understanding of the type and quantity of articles published related to XBRL. Literature reviews have been used in the past to identify trends and issues in a specific area (Lu and Heng 2009; Nutall 2009). A decade of XBRL literature may reveal trends, progress, puzzles, and outstanding issues. Though the concept of enhanced financial reporting using XML has been around for about a decade, XBRL has been in existence since 2000. The American Institute of CPAs (AICPA) provided initial funding for the concept of XML-based financial statements in 1998. XBRL has been initiated and developed by a diverse group of professionals, and therefore there are various opinions and expectations during this decade. From the start, XBRL was supported by a diverse group consisting of large accounting firms, software companies, professional organizations, and the banking industry. Two major meetings were in August and October 1999. In August 1999 the meeting was at the Woodburn Group, Minneapolis where 13 companies met with the AICPA to establish the XFRML Steering Committee. The initial steering committee included: The AICPA, Arthur Andersen LLP, Cohen Computer Consulting, Deloitte & Touche LLP, e-content company, Ernst & Young LLP, FreeEDGAR.com, Inc. (now Edgar Online, Inc.), FRx Software Corporation, Great Plains, KPMG LLP, Microsoft Corporation, PricewaterhouseCoopers LLP, and The Woodburn Group. In October 14 1999, the meeting took place in New York City at AICPA - the first meeting of the XFRML Steering Committee took place in the offices of the AICPA (Cohen 2008).

Perhaps, there has been an expectation gap between what XBRL was to deliver initially, and its current public perceptions. For example, initially the investing and preparer communities appeared to have expectation that standardization of financial reporting would bring clarity to reports and also expedite reporting process. Regulators, however, realized the value of XBRL as a "public good" that would increase transparency and monitoring of the financial reporting process in the capital markets.

2. METHODOLOGY

The literature review was conducted by searching two on-line databases. The study used "Pro-quest" and "EBSCO" databases as the starting point with additional web based searches of specific journals to validate and corroborate findings. The search was conducted to find all articles with XBRL in the title or in the abstract. The following information associated with the article was extracted from the database: Author, Title, Journal Name, Year, Abstract, Volume, Issue and Page. The relevant information was copied into Excel to facilitate detailed analysis. The articles were further classified into academic, practitioner and other categories.

3. DISCUSSION AND RESULTS

Over 1,600 articles were identified and summarized, see Table 1. Over ten years ago, the first article appeared in Accounting Technology (Cohen 1999) suggesting that XML offered many efficiency benefits for accountants, Additional early articles dealing with the use of XML in accounting and financial reporting appeared in the Journal of Accountancy (Anonymous 1999; Anonymous 1999; Fleming 1999; Harding 1999; Hoffman, *et al.* 1999), The CPA Journal (Anonymous 1999; Honig 1999; Kepczyk 1999; Schmidt and Cohen 1999), Practical Accountant (Anonymous 1999; Anonymous 1999; Anonymous 1999; Anonymous 2000), Business Wire (Business 1999; Business and High Tech 1999; Business Editors 1999; Business/Technology 1999), and Computerworld (Hoffman 1999).

Year	Number
2000	79
2001	92
2002	115
2003	130
2004	135
2005	194
2006	278
2007	223
2008	376
Total	1622

Table 1. Publications with XBRL included in Title or Abstract

As shown in Table 2, the academic community was engaged at the early stages of XBRL development. During the 1998-2008 periods there were 53 XBRL-related articles

published in 28 academic journals including The Accounting Review (Hodge, *et al.* 2004), European Accounting Review (Locke and Lowe 2007), Journal of Accounting and Public Policy (Boritz and No 2005), Accounting Horizons (Plumlee and Plumlee 2008) , and Journal of Information Systems (Hoffman, *et al.* 1999; Kepczyk 1999; Debreceny, *et al.* 2005; Bovee, *et al.* 2005; Farewell 2006). The first academic journal publishing XBRL related articles was *The International Journal of Digital Accounting Research* (Bonsón 2001) suggesting that digitalizing financial statements would "… play a key role for the development of the Global European Stock Market"   The diversity of academic journals publishing XBRL-related articles suggests that the academic community was fully engaged in development and direction of a new technology in business reporting; technology which would ultimately impact how financial reports are prepared, produced, filed with regulators, and made available to the investing community on a real-time basis.

	Academic Journals	**Total**
1	International Journal of Digital Accounting Research	**6**
2	The Journal of Government Financial Management	**6**
3	The Journal of Corporate Accounting & Finance	**4**
4	Balance Sheet (merged into The Journal of Risk Finance)	**3**
5	Internal Auditor	**3**
6	Journal of Information Systems	**3**
7	Current Issues in Auditing	**2**
8	Information Management Journal	**2**
9	Information Systems Control Journal	**2**
10	Issues in Information Systems	**2**
12	Managerial Auditing Journal	**2**
13	Accounting Horizons	**1**
14	Australian Accounting Review	**1**
15	Chartered Accountants Journal of New Zealand	**1**
16	European Accounting Review	**1**
17	International Journal of Accounting Information Systems	**2**
18	International Journal of Disclosure and Governance	**1**
19	International Journal of Management	**1**

Table 2. XBRL-related articles appearing in academic journals, 1998-2008 (I)

	Academic Journals	Total
20	International Journal of Technology Transfer & Commercialization	1
21	Journal of Accounting and Finance Research	1
22	Journal of Accounting and Public Policy	1
23	Journal of Database Marketing	1
24	Journal of Emerging Technologies in Accounting	1
25	Journal of Global Information Technology Management	1
26	Journal of Property Management	1
27	Journal of STEM Education : Innovations and Research	1
28	The Accounting Review	1
29	The Journal of Investment Compliance	1
	Total	53

Table 2. XBRL-related articles appearing in academic journals, 1998-2008 (II)

As shown in Table 3, XBRL was also of major interest to the large accounting firms and software companies suggesting that these organizations were willing to be active participants and invest significant resources in this venture. Examination of the Table 3 data also shows that some organizations were more active than others during the study period. Specifically, it appears that PricewaterhouseCoopers (99 abstracts) and Microsoft (177 abstracts) were the major forces behind many of the XBRL articles published in the last decade. Yet, although both PricewaterhouseCoopers and Microsoft have had significant roles in the development and promotion of XBRL, other organizations have also been involved in making XBRL specific tools and applications and increasing our understanding of its benefits.

Analysis of publication volume shows that the number of XBRL-related articles written during the last decade has steadily increased with exception of year 2007. As shown in both Table 4 and Table 5, there is a dip in article volume in 2007 with a significant increase in 2008. The year to year change from 2007 to 2008 was 82 percent for articles with XBRL included in the title (Table 4) and 79 percent for articles with XBRL in the abstract (Table 5). The increased efforts related to XBRL by the United States Security and Exchange Commission may have been a significant driving force to explain the large year to year change in article volume from 2007 to 2008. In particular, December 2007 marked the release of the new US GAAP XBRL taxonomy. The revised

and updated taxonomy was issued in February 2008 and the anticipated mandate for XBRL filings was set for 2009. The dip in volume from 2006 to 2007 in Tables 4 and 5, however, is more difficult to explain. One explanation may relate to the timing of the taxonomy efforts in the U.S. During 2007 there was not much "news" to report because of the active taxonomy development that was taking place in the U.S. It is conceivable that the XBRL community, including the academic community, was focused and involved in the design and development of this major milestone during 2007. Another explanation for this dip is that the academic community was waiting the new milestone (US GAAP XBRL taxonomy) to be completed to determine the future of XBRL, and accordingly assess new areas of research involving implementation issues of XBRL. There was also a dip in the number of XFRML articles from 2000 to 2001 (Table 6) attributed to moving from XFRML to XBRL.

KPMG		PWC		EY	
Title	Abstract	Title	Abstract	Title	Abstract
3	14	25	99	0	19
Deloitte		Grant Thornton		BDO	
Title	Abstract	Title	Abstract	Title	Abstract
0	19	0	19	0	12
UBmatrix		Rivet Software		Microsoft	
Title	Abstract	Title	Abstract	Title	Abstract
15	27	25	8	55	177
EDGARfilings		Hitachi		CoreFiling	
Title	Abstract	Title	Abstract	Title	Abstract
2	2	18	21	24	18
Fujitsu		DecisionSoft		SAP	
Title	Abstract	Title	Abstract	Title	Abstract
11	16	2	16	0	22
Notes: "Title" means XBRL in the title of the article. "Abstract" means XBRL in the abstract of the article					

Table 3. Accounting Firms and Software Companies Noted in Journals, 1998-2008

Year	Number	Change	%
2000	44		
2001	68	24	55%
2002	74	6	9%
2003	84	10	14%
2004	83	-1	-1%
2005	140	57	69%
2006	165	25	18%
2007	148	-17	-10%
2008	270	122	82%
Total	1076	806	

Table 4. Publications with XBRL Included in Title of Article

Year	Number	Change	%
2000	72		
2001	79	7	10%
2002	96	17	22%
2003	111	15	16%
2004	117	6	5%
2005	159	42	36%
2006	226	67	42%
2007	168	-58	-26%
2008	301	133	79%
Total	1329	1028	

Table 5. Publications with XBRL Included in Abstract of Article

Year	Number
1999	15
2000	26
2001	8

Table 6. XFRML Was Noted in Articles (Early Years of XBRL (XFRML))

Figure 1 graphs the volume of academic versus practitioner XBRL –related articles.

Although the graph indicates an active discussion of XBRL related material in practitioner and academic publications, the practitioner outlets began XBRL discusssions one year before the academic publications. In addition, the practicitioner journals have continued to publish more articles per year than the academic journals. Several factors may contribute to lower article volume for academic outlets including a relatively long review process that is typical for academic journals. The academic publication lag may also reflect the time required to integrate new activities such as XBRL into the academic curriculum and the challenge to find suitable outlets in existing academic journals for emerging accounting (versus traditional) topics such as XBRL.
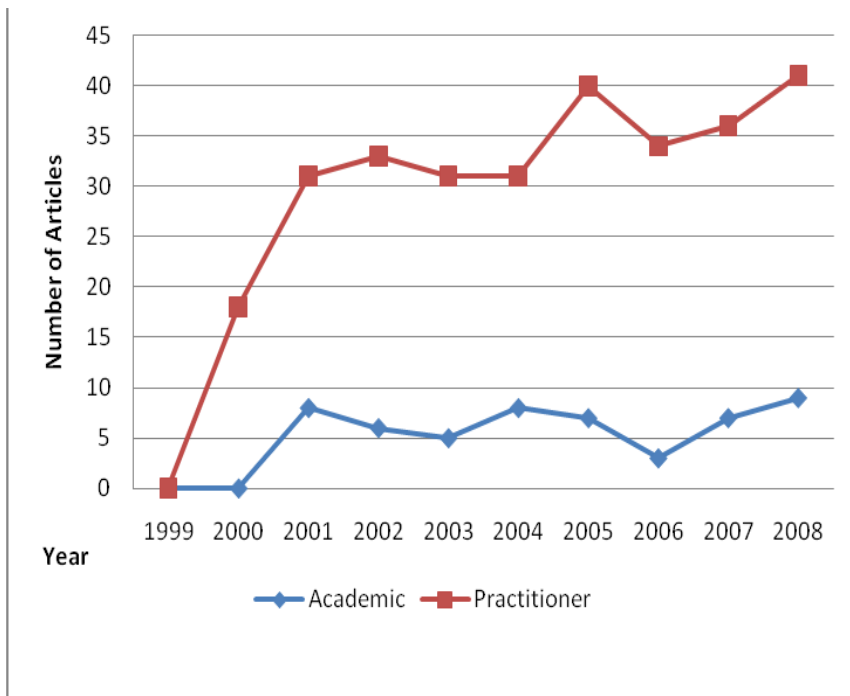

Figure 1. Published Articles with XBRL in the Title or Abstract

Table 7 shows the practitioner publishing outlets by year with results primarily in the United States, Canada, United Kingdom, Europe, Australia, New Zealand, and South Africa. Strategic Finance was the leader in publications with 79 articles, and Chartered Accountants Journal of New Zealand was second with 51 articles published during the study period. The Institute of Management Accountants (IMA), the publisher of Strategic Finance, has provided resources and steady support for the XBRL adoption since its inception. The large number of articles by the Chartered Accountants Journal of New

Zealand may also reflect their commitment and belief in XBRL. Specifically, New Zealand is planning to expand XBRL applications beyond the financial reporting domain and apply this concept to integrate business reporting with other reporting requirements of all participants of the business reporting supply chain, called standard business reporting (SBR).

Practitioner Journals	Total	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
Accountancy Magazine (UK, Wales)	12	1	1	2	0	1	1	3	1	2	0
Accountancy Ireland	16	1	3	2	7	0	0	1	1	1	0
Accountancy SA (South Africa)	5	1	0	1	1	1	0	0	1	0	0
Australian CPA (In The Black)	17	8	2	0	2	1	1	3	0	0	0
CA Charter (Australia)	7	0	1	0	1	2	2	1	0	0	0
CA Magazine (Canada)	8	1	0	1	1	0	1	1	1	2	0
California CPA	12	3	0	1	1	3	2	2	0	0	0
Chartered Accountants Journal of New Zealand	51	0	1	3	3	9	13	9	9	4	0
CGA Magazine (Canada)	5	0	0	0	1	2	0	1	1	0	0
CMA Management	7	0	1	1	1	1	1	2	0	0	0
Financial Executive	24		5	5	4	3	2	2	2	1	
Journal of Accountancy	16	4	1	1	5	1	1	0	0	3	0
Money Management Executive	16	5	4	4	3	0	0	0	0	0	0
Ohio CPA Journal	2	0	0	0	0	0	0	0	2	0	0
Pennsylvania CPA Journal	1	0	1	0	0	0	0	0	0	0	0
Strategic Finance	79	10	13	13	9	8	5	4	14	3	0
The CPA Journal (NY)	12	2	2	0	2		2	2	0	2	0
Today's CPA (Texas)	5	0	1	1	0	0	0	2	0	1	0
Totals	295	36	36	35	41	32	31	33	32	19	0

Table 7. XBRL-related articles appeared in practitioner journal 1999-2008, by Year

Figure 2 (based on Table 7) shows the global nature of the XBRL community during

the study period. Out of 295 practitioner articles, 63% (187 articles) were published by United States/Canada journals. Australia/New Zealand journals published 25% (75 articles), the United Kingdom/Ireland 10% (28 articles) and South Africa 2% (5 articles).
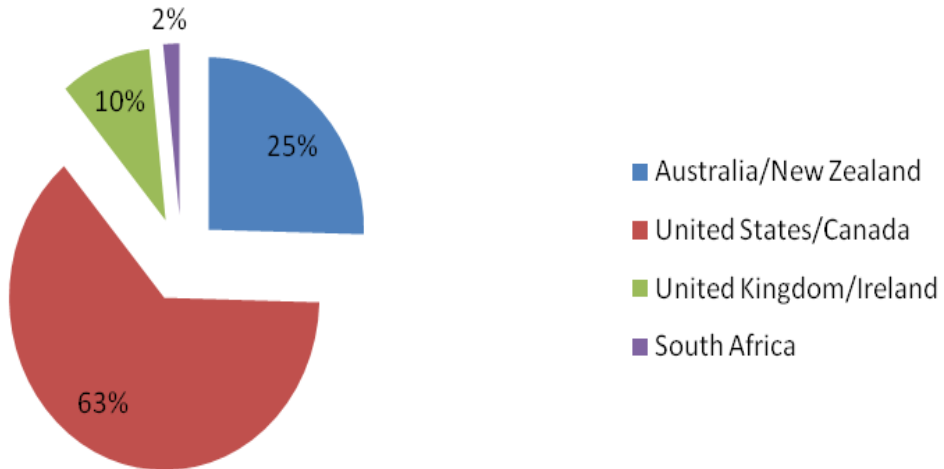

Figure 2. Practitioner Articles by origin of author

The analysis of academic journal publications related to XBRL is presented in Table 8. This data show 53 articles were published during the study period, and that only two journals have published six articles over the ten year study period: The International Journal of Digital Accounting Research, and Journal of Government Financial Management. It is clear that academic journals have published XBRL related articles at significantly lower rate than practitioner journals. The longer review time for academic journal as previously mentioned as well as the difference in the average number of articles may explain the lower publication volume for academic journals. Nevertheless, the number of academic XBRL related articles may well increase in 2010 and beyond as more journals are actively soliciting XBRL related articles given the new interest in XBRL by regulatory authorities.

Academic Journals	Total	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
International Journal of Digital Accounting Research *	6	0	1	0	1	2	0	1	1	0	0
The Journal of Government Financial Management	6	2	2	0	0	0	0	2	0	0	0
The Journal of Corporate Accounting & Finance	4	1	0	1	0	1	1	0	0	0	0
Balance Sheet (merged into The Journal of Risk Finance)	3	0	0	0	0	0	1	1	1	0	0
Internal Auditor	3	0	1	0	0	1	0	0	1	0	0
Journal of Information Systems	3	0	0	1	2	0	0	0	0	0	0
Current Issues in Auditing	2	1	1	0	0	0	0	0	0	0	0
Information Management Journal	2	1	0	0	1	0	0	0	0	0	0
Information Systems Control Journal	2	0	0	0	0	1	0	0	1	0	0
Issues in Information Systems	2	0	1	1	0	0	0	0	0	0	0
Managerial Auditing Journal	2	0	0	0	0	0	1	0	1	0	0
Accounting Horizons	1	1	0	0	0	0	0	0	0	0	0
Australian Accounting Review	1	0	0	0	0	1	0	0	0	0	0
Chartered Accountants Journal of New Zealand	1	0	0	0	1	0	0	0	0	0	0
European Accounting Review	1	0	1	0	0	0	0	0	0	0	0
International Journal of Accounting Information Systems	2	1	0	0	0	0	0	0	1	0	0
International Journal of Disclosure and Governance	1	0	0	0	1	0	0	0	0	0	0
International Journal of Management	1	1	0	0	0	0	0	0	0	0	0
International Journal of Technology Transfer & Commercialization	1	0	0	0	1	0	0	0	0	0	0
Journal of Accounting and Finance Research	1	0	0	0	0	0	0	1	0	0	0
Journal of Accounting and Public Policy	1	0	0	0	1	0	0	0	0	0	0
Journal of Database Marketing	1	0	0	0	0	0	0	0	1	0	0
Journal of Emerging Technologies in Accounting	1	0	0	1	0	0	0	0	0	0	0
Journal of Global Information Technology Management	1	0	0	0	1	0	0	0	0	0	0
Journal of Property Management	1	0	0	0	0	0	1	0	0	0	0
Journal of STEM Education : Innovations and Research	1	0	0	0	0	1	0	0	0	0	0
The Accounting Review	1	0	0	0	0	1	0	0	0	0	0
The Journal of Investment Compliance	1	1	0	0	0	0	0	0	0	0	0
Total	53	9	7	3	7	8	5	6	8	0	0

* The International Journal of Digital Accounting Research continues to be a leading contributor to XBRL academic articles with two that were recently published: Digital Reporting Formats: Users' Perceptions, Preferences and Performances, by Ghani, *et al*., (2009) and REA and XBRL GL: Synergies for the 21st Century Business Reporting System, by Amrhein, *et al*., (2009).

Table 8. XBRL-related articles appeared in academic journal 1999-2008, by Year

4. SUMMARY

The initial XBRL articles in the practitioner outlets tended to provide basic descriptive material about XML and/or XBRL and often extolled future benefits associated with use of expanded web capabilities for a wide variety of users of financial information. For example, in the Journal of Accountancy article titled "Top 10 Technologies –Plus 5 for Tomorrow, (Anonymous, 1999) XML is described as the "smarter sibling of HTML…. allowing information to be widely shared across all platforms. p.17" Later practitioner articles looked at a variety of issues ranging from international implications (Kernan, 2008) to the SEC's efforts related to XBRL (Barlas, 2008). Later articles also continued to provide basic descriptive information for those unfamiliar with XBRL (Phillips, Bahmanziari, and Colvard, 2008).

 International concerns were the focus of academics early on (Bonson, 2001). Other XBRL related topics covered in academic journal included the SEC's interest in a Financial Reporting using XBRL (Debreceny *et al.* 2005), Auditing and Assurance with XBRL (Bovee *et al.*, 2005; Plumlee and Plumlee, 2008) and Financial Reporting implications (Hodge *et al.* 2004). More recent XBRL related articles in the academic journals included a look at the potential synergies between the REA model and XBRL GL (Amrhein, Farewell and Pinsker, 2009) and an experimental study of the relationship between reporting format and user perceptions, preferences and performances (Ghani, Laswad and Tooley, 2009).

This study provides preliminary results of an analysis of XBRL articles during 1998-2008. Publishing activities relative to XBRL has been steady in both the academic and practitioner journals with practitioner journals publishing at a much higher rate than academic journals (Figure 1). The classification of the practitioner articles by national origin shows that most of them were published in U.S./Canadian journals (Figure 2). The study also demonstrates that the national accounting firms and software companies have had a continued interest in XBRL with PricewaterhouseCoopers and Microsoft being the dominant (but not only) forces in this area (Table 3). Yet, as XBRL becomes more widely understood, accepted and used, we may well see a decrease in the number of practitioner articles.

The analysis (Table 8) shows most academic journals tended to publish only one XBRL-related article over the ten year period with only two journals publishing as many as six articles (The International Journal of Digital Accounting Research and The Journal of Government Financial Management). The number of XBRL academic articles per year

has ranged from a low of 3 in 2006 to a high of 9 in 2008. The increase in the academic publication rate in recent years may be a function of the XBRL mandates that are increasing globally. It is conceivable that these mandates are stimulating interest in XBRL among the academic community. The future of XBRL research may include a wide variety of areas that interest accounting academics such as corporate governance, data analysis, integration of financial information with non-financial information, behavioral impacts, social responsibility, and financial reporting and data warehousing. If that is the case, 2010 and subsequent years may see a surge in the number of XBRL related articles published in academic outlets, particularly addressing filing issues, assurances of XBRL data, and proper use of XBRL documents/data.

5. LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES

This literature review was conducted by searching two on-line databases with the results copied into Excel to facilitate detailed analysis. While this approach has the advantage of providing comprehensive coverage of business related articles there may be publishing outlets not contained in them and thus the search is limited in scope. This study makes no attempt to identify XBRL efforts in each country and type of issues each country faced in adopting XBRL. Although there were countries such as China and Japan reportedly with significant involvement with XBRL development and implementation, XBRL related articles in these countries may have been missed by English speaking markets and in this study. It is speculated that further investigation of non-English publications relative to XBRL would increase of understanding of the global impact of XBRL.

A number of future research opportunities are also likely to develop as XBRL evolves along with the capabilities of the semantic web. In describing the "possibilities" associated with the semantic web, Berners-Lee, Hendler and Lassila (2001) predicted that:

"The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users"

Increasing our understanding of the complexities caused by the globalization, with greater web capabilities represent potentially fruitful XBRL research areas. According to Zaino (2010), XBRL … could be better, at least when it comes to being able to leverage the standard used in business reporting for presenting and retrieving financial report data across a range of languages. In addition to creating the need to "reconcile cultural and

linguistic differences" expanding web capabilities are also expected to create information security challenges (Baker and Roberts, 2010). Similarly, the greater transparency fostered by the semantic web is likely to require that "management … focus more energy and communicating and trust-building with multiple stakeholders (Kamil, 2008). As a consequence, future research could explore the usefulness, security and trust associated with semantic web information from the perspective of various stakeholders including employees, shareholders, board members, creditors, regulators, and analysts.

The perceived benefits of transparency especially as it relates to raw government data is the critical impetus behind the open data initiatives prominent in both the UK and the United States. These initiatives seek to promote the concept that "there are substantial social and economic gains to be made from opening government data to the public" (Hogge, 2010). Previous research in the area (Hogge, 2010; Anonymous, 2010) suggests that although progress has been made in improving government data transparency in United States, UK, Australia and New Zealand, some differences are apparent when comparing and contrasting the various countries. Future research may look to expanding our understanding of the effects of culture, politics and market forces on the drive to open more data to the public.

Lastly, XBRL and XBRL GL were not separately analyzed. Future research could expand our understanding of how XBRL GL can be used for internal reporting and documentation. Additional research would also be helpful to determine the extent to which XBRL provides benefits in other fields of business. In addition it would be interesting to conduct policy and behavioral studies using these articles to identify XBRL efforts in each country and type of issues each country faced in adopting XBRL.

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