# The Future of Global Financial Analysis eXtensible Business Reporting Language

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***Abstract*—eXtensible Business Reporting Language (*XBRL*) is expected to have a profound impact on financial data and business reporting through the world. Its underlying data structure taxonomy provides valuable tools for defining, aggregating, classifying, and reporting of financial data. The combined metadata – created by the taxonomy and tagging – provides financial analysts, investors, and interested parties with analytical instruments to search, assemble, and process financial data to be readily accessed and analyzed electronically. In 2009, the Securities and Exchange Commission (SEC), in the United States of America (USA), has mandated the use of *XBRL* for financial and reporting purposes, yet its application has been widely spreading all over the world and in the global financial markets. By year 2012, over eighteen countries have already adopted the use of *XBRL* as an aggregate tool for financial market reporting purpose. This research presents an update assessment of the use of *XBRL* based on the authors' training in the field and the review of previous relevant literatures. The paper focuses on providing a view of its technical aspects, benefits and limitation with less emphasis on detailed technical implementation.**

***Index Terms*—Electronic financial reporting, *XBRL* technical structure, XML-based financial statements, electronic financial analysis, standardized financial reporting, EDI.**

## I. Introduction

*XBRL* (eXtensible Business Reporting Language) is an application of *XML* (eXtensible Markup Language) to business information. The use of tag structure, to describe the data, makes it immediately reusable and highly interactive. It is also "extensible" therefore it can be customized for unique situations and reporting concepts. It makes the process of creating, distributing, reporting and analyzing business information more efficient and effective. The use of the technology itself is free with no loyalty fees, but customized written application programs are not free. Software developers created various applications to convert business data to *XBRL* format and translate the data into human readable forms. The leading development is under the auspices of the *XBRL* International (XII) which is a world-wide consortium of over 600 organizations devoted to creating international open standards for computerized business reporting presentation. Using *XBRL*, allows data analysts to directly extract published data on the Web to spreadsheet software format. In *XBRL*, data are identified by utilizing tagging [enclosed in angled brackets <>] system to standardize its collection and analysis.[1] The *XBRL* has its rules and syntax (structure) that can be used to build any set of relational information. The flexibility of *XBRL* language allows businesses to report electronically with a high semantic reliability which may change the way accounting and financial data are reported. It enables data segregation and integration which is considered a desirable auditing feature in areas such as tax compliance, internal and external auditing, and loans management paper. [2]

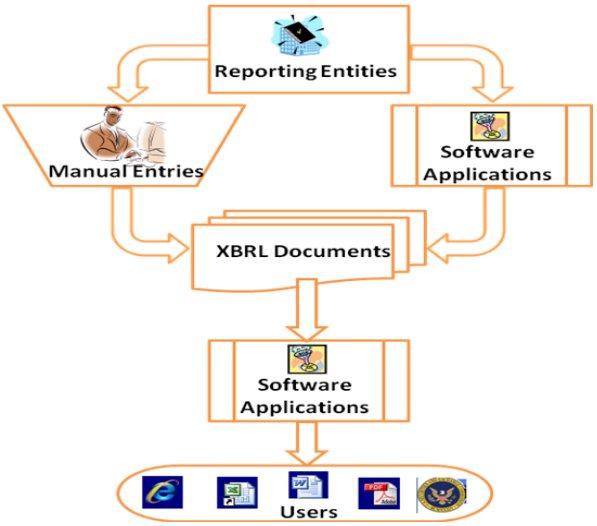


Fig. 1. *XBRL* concept.

## II. Historical Perspectives

The initial idea of using *XBRL* in business reporting started as early as in April 1998, when a Certified Public Accountant (CPA) named Charles Hoffman thought of using *XML* in financial reporting. The idea took various paths and in 1999. The American Institute of Certified Public Accountants (AICPA) created a business plan for *XML*-based financial statements, originally named *XFRML* (eXtensible Financial Reporting Markup Language). In July 2000, *XBRL* version 1.0 was formerly released and Securities and Exchange Commission (SEC) recommended more development. In 2001, the development and use of *XBRL* have started to spread across the world. The International Accounting Standards Board had, then, released a draft of the International Accounting Standards (IAS) taxonomy for review. The Institute of Chartered Accountants in England and Wales announced the formation of a working group to develop a United Kingdom's (UK) version of the *XBRL* taxonomy. Membership of using *XBRL* climbed to include U.K., Australia, Canada, Japan, Germany, and Netherland

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with a combined effort to support the development of *XBRL*. In 2002, SEC announced its effort in developing version 2.1. The year 2005, highlighted the inception of "Interactive Data Initiative" where the SEC encouraged its registered companies to voluntarily report their financial data using the *XBRL*. The U.S. Federal Deposit Insurance Corporation (FDIC) required member banks to submit quarterly - "Call Reports" in *XBRL* format - directly to a Central Data Repository established by the U.S. Federal Financial Institutions Examination Council (FFIEC).[3] Also the International Accounting Standards Committee Foundation (IASCF) released a final version of IFRS-General Purpose taxonomy. In 2006, other countries joined the effort of using and developing *XBRL* specific to their needs. The SEC in the USA released a Request for Information (RFI) to the software industry concerning interactive financial data, as it continues to explore the use of *XBRL*. In 2007, *XBRL* concepts were mapped to Generally Accepted Accounting Principles (GAAP) in the USA. In 2008, the SEC required mandatory filing using *XBRL* in 2009, and made it mandatory in 2011. The top 500 publicly traded companies had to comply with SEC's rule from June 2009, with three-year phase-out for mandatory implementation for the rest. In 2010, iPhone application and quality review were introduced. In 2011, corporate action taxonomy and other applications were implemented. Since the SEC's mandate announcement, companies across the Globe have been preparing various applications using *XBRL*. [4] In 2012, the *XBRL.US* supported the Digital Accountability and Transparency Act of 2011, and recommended to the USA House of Representatives the implementation of *XBRL* as being a uniquely suited reporting language to financial, accounting and performance-related data for business and government reporting. Bringing *XBRL* to financial data processing improves its integrity, decreases data automation processing cost, and increases its quality. *XBRL* has becoming a reporting requirement for organizations around the world, including the United States [by January 2013, 9,120 companies filed with SEC; 56,528 XBRL submissions], securities regulators in China and Japan, numerous banking regulators in Europe and government agencies in Australia, the Netherlands and the United Kingdom (UK)., IASB (IFRS), Ireland, Israel, Korea, New Zealand, Spain, Taiwan, Thailand, and others. In the U.S.A. in 2012, a new updated taxonomy was approved for filing and currently the 2013 new taxonomy draft has been out for comments. [5]

## III. *XBRL* Technical Structure

*XBRL* uses *Specifications* [grammar like in other computer languages] that are used to build an application *Taxonomy* [dictionary like of all rules applied and definitions] for financial and accounting *Instance* [reported document] including some *Element and Attributes* [sentence formation] without going into too much technical details. Converting the financial data into *XBRL* format helps in maintaining business information in digital form. That form enables various interested parties to exchange financial data in multiple formats for various purposes [financial, taxes, government] without spending the effort to rebuild the data structure but rather extract the needed data into the desired format for analysis and decision-making.

*XBRL* structure have audit-ability feature that is called *Validation* to conform to its contents. It can also adapt to various applications that is why it is deemed *Extensible* [expandable]. *XBRL* allows modeling of information and expression which has semantic [has meaning relevant to its context] meanings. It uses *XML* and its related technology such as *XML Schemas* (define an item or concept given a name such as "NetIncome" "CostOfGoodsSold"). When *schemas* are linked together they form taxonomy (relational structure and sequence)]. The X*Link* links data entry to a certain source for conformity and comparability purposes. For example, to write the date we have to conform to "ISO 8601" format that is yyyy-mm-dd. This practice is to maintain uniformity in interpreting data for comparability. It may also include unit that is representing an item such a monetary unit where we have then to use "ISO 4217" format of three letters or numbers to represent the monetary unit of a country, that code is used to report the financial data of businesses in different countries. For example, the code for United States Dollar is "USD or 840", European Union is "EUR or 246", Italian Lira is "EUR or 380 and/or ITA or 380", and for United Kingdom Pound Sterling is "GBP or 826". The expression *XPath* combines and defines relationship between concept such as *label, reference, presentation, calculation, and definition's linkbase*. and *NameSpaces* to articulate its structure. It is a way of communication that is defined by metadata [data about data] set of taxonomies. *XBRL* International supports and sponsors a membership system of those who are interested in building new applications. The main purpose is to validate and approve these applications.

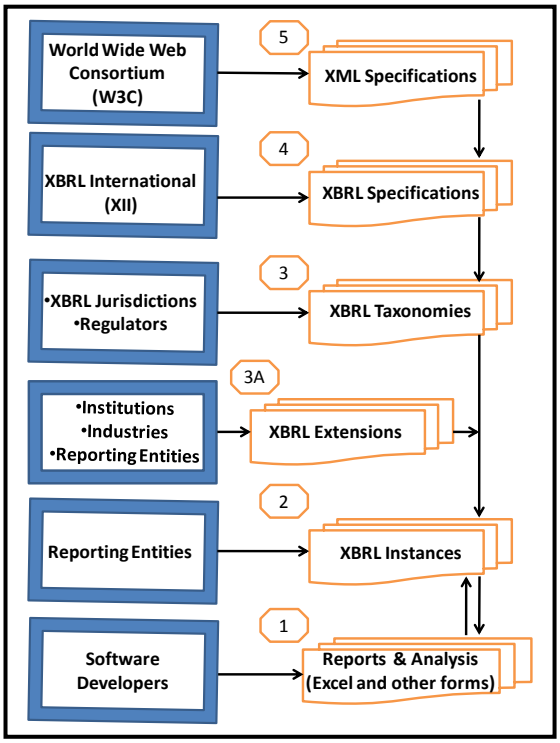



Fig. 2. XBRL Resources and Organization

*XBRL*, when compared to *HTML* and *XML*, is considered a

multi-dimensional language. *HTML* (Hypertext Markup Language) is a standard way of marking up a document so it can be published on the World Wide Web and viewed in a browser. It provides a set of pre-defined *tags* [marks] that describe how contents appear in a Web browser. For example, it describes the font and color of a published and/or searched text. It gives little information on meaning or context. On the other hand, *XML* is a standard language – that is maintained by the World Wide Web Consortium (W3C) - uses tags to identify the meaning, context and structure of data. *XML* does not replace *HTML*. It is a complementary format that is platform independent, allowing *XML* data to be rendered on any device such as a computer, cell phone, Personal Digital Assistant (PDA) or tablet device. *XML* enables rich, structured data to be delivered in a standard, consistent way. Whereas *HTML* offers a fixed, pre-defined number of tags, *XML* neither defines nor limits tags. Instead, *XML* provides a framework for defining tags (i.e. taxonomy) and the relationship between them (i.e. schema). *XBRL* is an *XML*-based schema that focuses specifically on the requirements of business reporting. *XBRL* builds upon *XML*, allowing accountants and regulatory bodies to identify items that are unique to the business reporting environment. In *XBRL* sentence structure defers from spreadsheet in terms of its flexibility and processing speed.

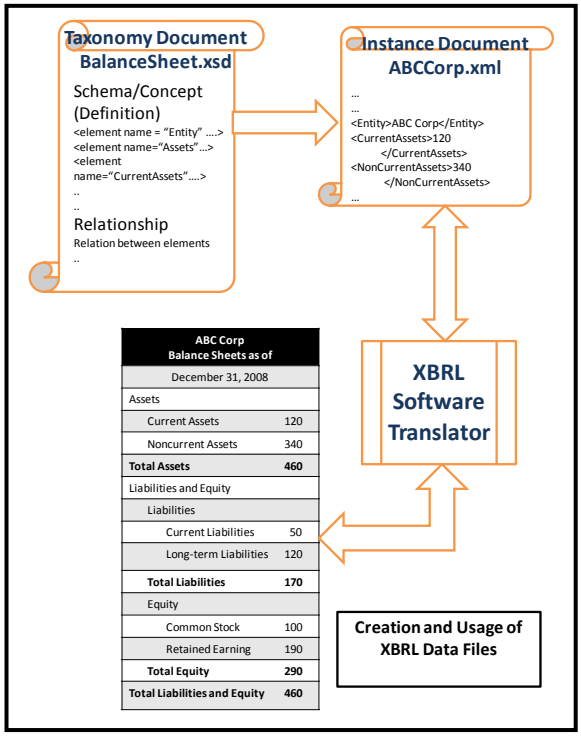
In contrasting *XBRL* with spreadsheet application, we may identify the columns and rows in the spreadsheet as being coordinates for data's location. For example column "A" first row cell is identified as A1. Consequently when we write formula using spreadsheet software such as in *Excel*, we rely on coordinates to locate the variables [amount, quantity, text, date] needed for certain operation [formulas, display, and comparison]. In *XBRL* instead of using columns and rows identifiers, value has entity name, date, time, and measurement unit. As demonstrated below, these aspect values are used by *XBRL* in place of coordinates [cell in Excel] when specifying its inputs and outputs. For example if we want to determine the value of net income, we have to identify the coordinates for each item of the formula to reach to net income. These coordinates would then be sales, cost of goods sold, and another coordinate cell for the resulted output. In *Excel*, if we want to apply the same formula for another year or another business we have to look at the cells location. In *XBRL* we define the entity that is "Sales", entity "CostOfGoodsSold", and entity for "NetIncome". Then the new entity would be "NetIncome=Sales– CostOfGoodsSold". This aspect or meaning will be applied to any company in any period without having to refer to a specific dimension data range. The flexibility comes from the freedom from using or tying-up to any location. Any item or concept that has the same definition will be exposed to the same operation.

## IV. Document Structure

This section provides a clarification of how accounting or financial document are converted from its regular traditional written format to the *XBRL* and back to human readable financial reports. For our clarification purpose, we would consider that the *instance* is representing the Balance Sheet of ABC Corporation as December 31, 2008. When we used the terminology to consider balance sheet as instance means we ta [mark it between angled brackets < >] it. Once we tag it, we can use the taxonomies created by *US GAAP* to convert the balance sheet into *XBRL*. From the *US GAAP* classification list we are going to select the equivalent tags, schemas and taxonomies that match the selected "tagged < >" balance sheet. If we convert the ABC data (Fig. 3) intro *XBRL* taxonomy we have to define the hierarchy of these elements as presented in the *US GAAP XBRL* below:

<element name = "Entity" ….>, <element name="Assets"…>, <element name="CurrentAssets"….>. Then we apply this hierarchy of names to the reported entity that is ABC: <Entity>ABC Corp</Entity>, ContextRef="Balance Sheet", <CurrentAssets>120</CurrentAssets>, ContentRef="USD" decimals="INF">120000000</usfr-pte:CurrentAssts>,<PeriodOfReport>2008-12-31</PeriodOfReport>.

The tagging process in this scenario packaged information - such as definition, label, reference, time, and date - around individual number to build an *instance*. The *instance* represents reportable business facts. As it is explained earlier, *Schemas* are expressions used to define elements or items. Consequently the value of $120 million has an element that is current asset, which has date [as of December 31, 2008], numeric value (US Dollar), scale [million], and perhaps other optional scenarios such as audited, unaudited, or actual versus projected value.




| ABC Corp Balance Sheets as of | |
|---|---|
| December 31, 2008 | |
| Assets | |
| Current Assets | 120 |
| Noncurrent Assets | 340 |
| **Total Assets** | **460** |
| Liabilities and Equity | |
| Liabilities | |
| Current Liabilities | 50 |
| Long-term Liabilities | 120 |
| **Total Liabilities** | **170** |
| Equity | |
| Common Stock | 100 |
| Retained Earning | 190 |
| **Total Equity** | **290** |
| **Total Liabilities and Equity** | **460** |

Fig. 3 XBRL Document Structure and Use

Current software tools allow accounting users to map charts of accounts and other structures to *XBRL* tags. Data from accounting databases can be extracted in *XBRL* format. It is not strictly necessary for an accounting software vendor to use *XBRL*; third party products can achieve the transformation of the data to *XBRL*. Yet, the recent updated

accounting and financial software, including taxation, have considered the integration of *XBRL* in its programing structure.

Another valuable development on the same line of accounting application is *XBRL GL* (Global Ledger). It is intended to enable the efficient handling of financial and business information contained within an organization. The Global Ledger allows the representation of anything that is found in Enterprise Resource Planning (ERP) systems such as: setup files, master files, transaction files and history files, and deals with information in both form; financial and non-financial. It collects general ledger and after-the-fact receivables, payables, inventory and other non-financial facts, and then permits the representation of that information using traditional summaries and through flexible links to *XBRL* for reporting. It is supposed to be able to represent information in great details, summary and functions integrating the interaction of *US GAAP* taxonomy.

## V. Application of *XBRL*

Since its inception and throughout its development process, *XBRL* has been adopted for various applications around the Globe. Its current application has not been limited to but includes the following objectives:

- Enhancing companies' internal and external financial reporting system.
- Securing a business reporting mechanism to various regulators, including tax and financial authorities, central banks and governments.
- Filing of loan reports and applications; credit risk assessments. Used by FFIEC/FDIC for quarterly data collection from US banks since 2005.
- Monitoring loan processing system and data collection for quarterly reporting, reporting to regulations, tax purpose, decision-support; business activity management, benchmarking and analysis, budget and forecasting by HUD (Housing Urban Development)/FHA [loan and property administration].
- Filing for taxes by various countries.
- Filing and reporting with SEC.
- Combining data by governmental agencies.
- Exchanging of information between government departments or between other institutions, such as central banks.
- Maintaining an authorities accounting literature - providing a standard way of describing accounting documents provided by authoritative bodies
- Preparing financial and statistical data where there is a need to be stored exchanged and analyzed.
- Enhancing tax compliance and reviewing business data before filing for the purpose of obtaining advices on the proper treatment of certain revenue and expenses for various tax purposes. It enables the exercise of more control by the regulators and government agencies to monitor compliance with their published rules.

Strengthening the internal auditing and regulatory filing: process efficiency, cost saving and supporting a new collaboration model with external auditors. The International Auditing and Assurance Standards Board (IAASB) plans to release an exposure draft in June 2012 in its ongoing project on the auditor's reporting model with additional information to be provided on the XBRL tagging data. [6]

In addition, the IAASB has formed a working group to explore issues such as auditing or assurance on:

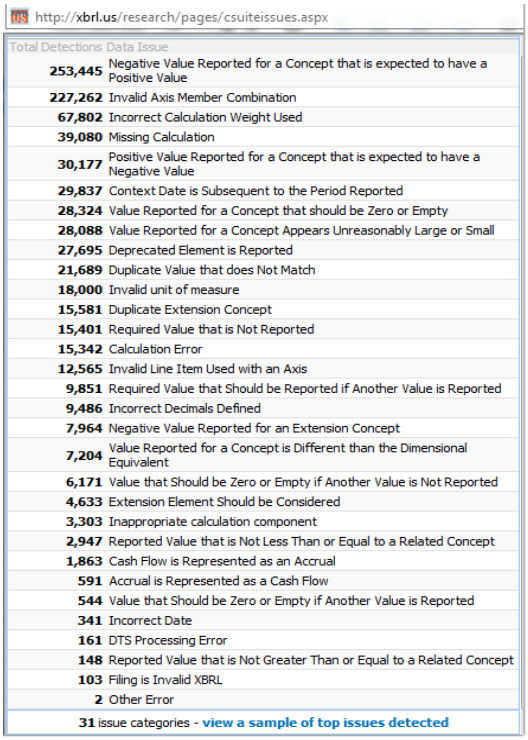
- Controlling the process of mergers and acquisitions specially the use of" real time" feature in general share data and actual rule. It is centralized, consistent and application independent.
- Integrating detailed data with end reporting
- Tracking information regarding fixed assets management.
- Establishing (OECD, v2,1) central standards for exchange of business financial information for tax purpose USA (Internal Revenue Service, FDIC, SEC), UK, the Netherlands, Canada, Australia, South America, Japan, Chili, Mexico, China, etc.
- Designing various applications in human resources management, payroll, and inventory control.

## VI. Implementation Assessment

*XBRL* has been proven, through its various implementations, to be an effective flexible tool in building various applications for financial and business reporting systems that include both quantitative and textual information. Among its beneficial features are, but not limited to, the following:

- Adoptability to universal application including integrated translation into up to 40 languages.
- Richness and powerful structure allows very efficient handling of business data by computer software.
- Validation process included in its structure provides an audit trail to validate consistency, existence, and value assertions.
- Augmented formula chaining where one output is the input for another formula [A=B+C, C=D+F, we solve C first then replace its value in the first formula] provides a way of underlying a complex formula into a chain of sequential operations speeding processing time and enhancing data storage.
- Flexibility in supporting all the standard tasks involved in compiling, storing and using business data eases the process of searching, selecting, exchanging or analyzing data by computer, or to be published for ordinary viewing.
- Standardization of recording, storing and transmitting business financial information delivers major cost savings and gains in efficiency, improving processes in companies, governmental and other organizations.[7]
- Enhanced usability of financial statements information. Eliminate the need to re-key financial data for analytical and other purposes. By presenting its statements in XBRL, a company can meet the requirements of regulators, lenders and others consumers of financial information, who are increasingly demanding reporting in XBRL. This will improve business relations and lead to a range of benefits.
- Automated Data collection make the data integration from different company's divisions with different accounting systems can be quickly assembled cheaply and efficiently.

- Reduced data manipulation and validation time, reduces compliance burden, and reduces production time for same data for different representation..
- Wide adaption for various needs and format anticipated by all participants in the financial information supply chain makes planning processes to be more effective and efficient.
- Feasibility of exchanging information and collaboration across-government enhances the compliance with regulation.
- Streamlined traceability of information and enhanced financial reporting transparencies, increases information reliability.
- Adaptability to abstraction of business rules that can be applied across a wide range of software application reduces its operating cost.[7]
- Availability of broader set of monitoring controls and assessment ultimately enable continuous auditing and commit resources to specific data concepts. In addition, it enhances reports' reviews process and assembly to comply with the requirement of Sarbanes-Oxley (SOX) Act in the USA.
- Elimination of data redundancy across disparate information source streamlines the creation of financial reports for internal and external use.
- Employing mapping concepts with appropriate taxonomy provides consistency, completeness and promotes sustainable reporting, and improves the ability of companies to more precisely direct and publish financial information to investor, regulators, analysts, lenders, and other interested parties.


http://xbrl.us/research/pages/csuiteissues.aspx

| Total Detections | Data Issue |
|---|---|
| 253,445 | Negative Value Reported for a Concept that is expected to have a Positive Value |
| 227,262 | Invalid Axis Member Combination |
| 67,802 | Incorrect Calculation Weight Used |
| 39,080 | Missing Calculation |
| 30,177 | Positive Value Reported for a Concept that is expected to have a Negative Value |
| 29,837 | Context Date is Subsequent to the Period Reported |
| 28,324 | Value Reported for a Concept that should be Zero or Empty |
| 28,088 | Value Reported for a Concept Appears Unreasonably Large or Small |
| 27,695 | Deprecated Element is Reported |
| 21,689 | Duplicate Value that does Not Match |
| 18,000 | Invalid unit of measure |
| 15,581 | Duplicate Extension Concept |
| 15,401 | Required Value that is Not Reported |
| 15,342 | Calculation Error |
| 12,565 | Invalid Line Item Used with an Axis |
| 9,851 | Required Value that Should be Reported if Another Value is Reported |
| 9,486 | Incorrect Decimals Defined |
| 7,964 | Negative Value Reported for an Extension Concept |
| 7,204 | Value Reported for a Concept is Different than the Dimensional Equivalent |
| 6,171 | Value that Should be Zero or Empty if Another Value is Not Reported |
| 4,633 | Extension Element Should be Considered |
| 3,303 | Inappropriate calculation component |
| 2,947 | Reported Value that is Not Less Than or Equal to a Related Concept |
| 1,863 | Cash Flow is Represented as an Accrual |
| 591 | Accrual is Represented as a Cash Flow |
| 544 | Value that Should be Zero or Empty if Another Value is Reported |
| 341 | Incorrect Date |
| 161 | DTS Processing Error |
| 148 | Reported Value that is Not Greater Than or Equal to a Related Concept |
| 103 | Filing is Invalid XBRL |
| 2 | Other Error |
| 31 | issue categories - view a sample of top issues detected |

Fig. 4. Error in SEC Filing Using XBRL

While *XBRL* use in financial reporting has gone through a continuous improvement process since its inception in 1994, yet it has not reached yet the high level of accuracy that is expected when dealing with various financial reporting on the global and national scales. In January, 2013, the xbrl.us reported that 9,121 public companies filed 56,536 XBRL submission, and 885,600 data issues and errors reported.

We have to be aware of the real scope of using *XBRL* without rushing to its implementation in all financial and accounting reporting before completing a feasibility cost-benefit study. Companies need to evaluate auditing process and compliance with SEC mandates and identifying priory areas that are logical considered as candidates for the application of standardized approach and other manual control processes where automation would be considered.

## VII. Conclusion

The paper presented how the *XBRL* adds meaning and contents to the financial reports and provides extensive and integral analysis of data for various purposes. The paper started by an introduction of the *XBRL* and its use in financial reporting and the technique used in tagging mechanism of the financial data and transforming data into usable information for multiple purposes and locations. There are pros and cons of XBRL implementation in financial reporting and analysis, yet the non-financial reporting may not be cost efficient. Also the maintenance process of updating the tagging process and involved labor in programing and training may pose a financial burden on businesses to comply with its technicality and audit-ability. Nonetheless, the application of *XBRL* by financial analysts is proliferating in the financial markets and beyond. [8] Consequently, more training and study are needed in this field and also the need to educate business graduates about the *XBRL* use in business. *XBRL* is here to stay and to be more efficient through the efforts of continuous improvement.

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