Exploring the Features of Financial Reports of Companies Adopting Blockchain: Text Analytics Approach

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Abstract
Companies are increasingly announcing the use of, or plan to use blockchain technology. The Blockchain technology can be used for multiple purposes such as data storage, validation of transactions, and mitigating data breach incidents. Auditors can benefit from the security and validation of transactions through blockchain platforms to minimize their routine works and to enable them to focus on data analysis using larger samples. Our aim is to explore if the use of blockchain technology affects financial reporting to be more focused and more informative. We will use text analytics to examine how the financial reporting for companies that announced the adoption of blockchain technology differ from their previous financial reporting and from those companies that did not announce the use of blockchain in any form.

Keywords: Financial reporting, blockchain technology, text analytics.

Introduction
The objective of accounting reports is to provide useful information to stakeholders of an entity. Accounting authorities frequently issue new rules or guidance especially after the occurrence of scandals (Love and Lawson 2009; Ronen and Yaari 2008) that have affected investors’ confidence, forcing regulators to tighten the laws, and impacted the integrity perception of the accounting profession.

Nakamoto (2008) ideas are the bases for blockchain technology that minimizes the intermediation between parties. This technology has emerged after the economic scandals and the recession in 2008. Blockchain technology is an innovative way to communicate a company’s information to stakeholders. This technology is a principal feature of the new era of business transactions, and it will affect most professions in a short period. The well-considered disruptive effects of Blockchain are bitcoin and fundraising among other finance activities. Although blockchain technology can contribute to different areas, it is not widely used in other activities. The disintermediation is expected to occur in all sectors of the economy (Mainelli and von Gunten 2014; Schatsky and Muraskin 2015; Swan 2015).

The Blockchain technology can be used for multiple purposes such as data storage, validation of transactions, and mitigating data breach incidents. Also, blockchain technology can be extended to a variety of business activities, including accounting and auditing functions and processes. In the era of blockchain technology, companies communicate the results of operations or any material transactions to the investors and other stakeholders using private or public blockchain platforms. The security and validation of transactions through blockchain platforms ease the auditors’ routine works and enable them to data analysis using larger samples.

Our main objective in this paper is to examine how the financial reporting for companies that announced the adoption of blockchain technology differ from their previous financial reporting and from those companies that did not announce the use of blockchain in any form. By using text analytics, we aim to determine the volume and quality of sample companies’ financial reporting. For this purpose, the article is organized as follows: the next section discusses the main theoretical background of financial reporting and blockchain technology. The third section presents text analysis as part of the research methodology. The fourth section deals with the findings, and in the last section, we present the main conclusions, limitations, further research and implication to accounting and information system professionals.
Background

During the 70s and 80s, information technology was implemented as an internal department of many companies. After Kodak agreement to outsource its IT department in 1989, companies have started outsourcing full or part of their IT departments. Companies are continually evaluating their core and profitable activities (Juma’h and Wood 1999). Focusing the firm’s resources on the most profitable activities and acquiring others from the market strengthens the firms economic and market situations. New forms to conduct business and to combine market and in-house sources are increasingly being used by firms to improve operational and financial efficiency. Blockchain technology platforms are increasingly used to validate, communicate, and store data for different companies’ activities.

Accountants have the responsibility to inform investors about the material economic transactions and events. The new ways of conducting business increase demand for narrative reporting and accompanying notes to the financial statements that challenge the traditional accounting and auditing reporting (Duska et al. 2018). Accountants can be held liable for not disclosing material economic obligations. Accountants and auditors need to be well trained about the new ways of adequate reporting quality and auditable performance indicators to reasonably substantiate the notes of the financial statements (Thompson 2018).

The increasing demand for narrative reporting and accompanying notes to the financial statements challenge the traditional accounting and auditing reporting (Thompson 2018). Auditors are fiduciary who has the responsibility to provide information about their performance to the shareholders, and to the secondary users of financial statements. Not including material economic transactions that include contingent liability can be considered as an agency problem. Other challenges may arise for auditors regarding considering off-balance sheet capital and how to capture them. Auditors need to be well trained about the new ways to establish adequate auditable performance indicators to reasonably substantiate the notes of the financial statements. Blockchain technology can minimize auditors’ routine tasks such as confirmation of transactions and increase the focus on analysis and benchmarking tasks.

In the absence of official materiality guidelines to support auditors’ work, rules of thumb take into consideration the nature of the item and the size of the entity. The materiality concept is associated with the risk concept which is viewed as a measure of uncertainty. More efforts from practitioners and standard setters are needed to reach the comparability of financial and non-financial disclosures. Quantitative materiality measurements are part of the risk levels, but the lack of clarity and specificity regarding the interpretation and application of professional judgment in both the financial reporting and auditing literature is a general problem.

Blockchain technology is a distributed data structure, or ledger, in which transactions are recorded and verified instantaneously through consensus algorithms. These systems keep records of ownership and transaction timestamps, eliminating the possibility of digital copying and, thus, double-spending. The blockchain technology can provide investors with greater trust and transparency, but there are some risks and accountants are usually slow adopters of new technologies. Distributed ledgers are examples where blockchain can be used. Blockchain can be used as an audit trail, under traditional and nontraditional audit processes. Blockchain technology can be implemented in conjunction with traditional auditing procedures when introduced. Larger sized entities are introducing this technology to modernize their operations. The auditor must conduct tests of control to ensure that blockchain technology is operating effectively and adequately. Data Analytics and insights from big data can afford added information to auditors and strengthen the auditors’ analytical procedures. Audit firms are likely to act as pioneers in driving forward innovation in audit processes to strengthen their competitive advantage, and to satisfy the users of financial reports who are keen about innovative technology.

Based on the effect of blockchain technology effect on companies’ performance and financial reporting, three effects can be derived. First, the disruptive effect of the technology on accounting and auditing is not fully anticipated, and smaller auditing firms are not tooling up to face the changes to come. Second, the profession will go through a paradigm shift in two ways: become more IT than accounting oriented and become more forward than backward-looking. Lastly, the profile of the auditors will change, and the auditing of blockchain is challenging the traditional role of auditors. The transparency, traceability, immutability, and integration of rules and procedures embedded in the technology itself may improve processes and information, so the control and audit procedures may be modified or eliminated. Also, it
offers opportunities for auditors to reshape best practices, update rules and procedures to increase the value-added services.

**Data collection and coding**

Our research is exploratory and descriptive. A list of companies that have announced the use of blockchain technology will be identified by searching online compilations, Internet magazines that focus on blockchain technology such as Forbes, Crypto news, and Webpages of blockchain technology providers. After identifying announcements of companies adopting blockchain, we will validate the information from companies Webpages, financial reporting such as 10-k and their announcements. We will classify companies by actual users of blockchain, companies announcing their intention to adopt blockchain and then we will identify their main competitors to build a benchmark. Companies in the benchmark should not have announced any blockchain use or the intention to use blockchain.

The financial reports for the target companies will be collected from the Mergent Online database. We also collected nonfinancial data related to the characteristics of transactions that are included in blockchain platforms; this includes the type and volume of transaction. The acquired reports will be organized in a database in addition to other attributes and variables related to the target companies. We will search for specific terms such as blockchain, technology contracts, contingency. The 10K-Form information will be classified as items in financial statements, notes to the financial statements, the statements, and reports of management and auditors, and general information of companies. We will search for most repeated terms and compare them with previous 5 10k-forms and with the benchmark.

Text analytics includes applications and algorithms for turning unstructured data to analyze it using various statistical methods. Generally, there are two main approaches to the problem of text mining. The first approach is the lexicon-based (unsupervised) approach involves analyzing reviews based on the words and phrases in the text using natural language processing (NLP) and computational linguistic approaches (CLA) (Pang and Lee 2008). In contrast, in the supervised approach, researchers train classifier algorithms based on predefined labels and synonyms of the report’s text mining (Taboada et al. 2011). Text mining is usually done using a lexicon-based approach by software because of its efficiency and scalability. Our data cleaning and variables coding will follow the diagram below (Table 1 and Figure 1).

![Figure 1: Data Cleaning and Variables Coding](image)

<table>
<thead>
<tr>
<th>Table 1: Example of Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blockchain</td>
</tr>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Information systems</td>
</tr>
<tr>
<td>Contract, contracts</td>
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<tr>
<td>Outsource, outsourcing</td>
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<tr>
<td>Contingency, contingent liability</td>
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<tr>
<td>Information technology, IT</td>
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<tr>
<td>Smart contracts</td>
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<tr>
<td>Subcontract, subcontracting</td>
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<tr>
<td>Crowdsourcing</td>
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<tr>
<td>Litigation</td>
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<tr>
<td>Risk factors</td>
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<tr>
<td>Derivatives</td>
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<tr>
<td>Leasing</td>
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</tbody>
</table>

We will apply a simple text mining technique. Before training the classifiers, the unwanted characters and punctuations will be removed from the financial reports. In order to use the financial report text to train
the classifiers, “Term-by-Frequency Matrix” will be created. Since somewhat meaningless words such as “a,” “all,” “the” in the reviews are not useful in judgment, they will be eliminated from “Term-by-Frequency Matrix” to reduce the number of columns. While the “Term-by-Frequency Matrix” weighting has been used to train the classifiers’ algorithms in past studies (Ngo-Ye and Sinha 2014), only using the term frequency cannot discriminate the reviews effectively (Cao et al. 2011). This is because one term that appears commonly in one review may also appear in other reviews. The term frequencies will be transferred by TF-IDF weighting (Term Frequency-Inverse Document Frequency). TF-IDF value increases comparability to the number of times a word appears in the financial report but is offset by the frequency of the word in all the reviews (Arazy and Woo 2007; Cao et al. 2011; Salton et al. 1975). The TF-IDF has been reported to increase the information retrieval precision up to 70 percent when compared to the Term-by-Frequency Matrix (Salton and Buckley 1988). Equation 1 shows the standard TF-IDF weighting (Arazy and Woo 2007; Cao et al. 2011; Salton et al. 1975).

\[
w_{ij} = t_{f_{ij}} \times idf_i \quad \ldots \ldots \ (1)
\]

**Conclusion**

This paper relates accounting financial reports to the blockchain technology, and how the traditional accounting and auditing reports can be after a company adopts blockchain technology. We use text analysis to determine the characteristics of the financial reports before, and after adopting blockchain, also, we compare blockchain adopters with their competitors that did not announce any adoption of blockchain technology.

The blockchain technology most notable applicability is a cryptocurrency, but it is still developing for other activities, and companies are overwhelmingly announcing their intention to use this new technology in different activities. The early stage of using blockchain technology is the main limitation of our study to identify the correct use of this technology. Because this paper will use exploratory research, we can offer a starting point to continue searching for how new technology can affect accounting practices.

**REFERENCES**


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