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## **The Impact of Big Data on Audit Evidence and the Level of Assurance**

Sachin Yadav

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The University of Southern Mississippi

The Impact of Big Data on Audit Evidence and the Level of Assurance

by

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A Thesis  
Submitted to the Honors College of  
The University of Southern Mississippi  
in Partial Fulfillment  
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## Abstract

This study seeks to establish the relationship between Big Data and its impact on the quality of audit evidence and the level of assurance perceived by the end-users. Currently, auditors rely on sampling to provide reasonable assurance that a company's financial statements are materially in accordance with a country's Generally Accepted Accounting Principles (GAAP). With Big Data, auditors can minimize the risk posed by sampling, and therefore, provide a reasonable level assurance. The present study examines financial statement users' perceptions of the level of assurance when auditors present unqualified opinions using Big Data during the audit engagement. It observes this issue in the context of an audit engagement whereby the financial statements are misstated.

Key Words: Big Data, Data Analytics, Assurance, Auditor, Audit evidence, Sampling, Audit engagement, Structured, Unstructured

## Dedication

This study is dedicated to my family. It is for their hard work and faith in me that helped me come so far in my journey to achieve higher education.

I would also like to thank Heer Patel for her support and encouragement since the very beginning of this long and arduous journey.

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## **CHAPTER 1: INTRODUCTION**

This study investigates the role of Big Data on the quality of audit evidence. Currently, auditors rely on sampling to provide reasonable assurance that a company's financial statements are material and fairly presented in accordance with a country's Generally Accepted Accounting Principles (GAAP). Big Data and Big Data analytics present auditors with the ability to audit populations of select financial statement line items. Therefore, it is conceivable that financial statement users may expect auditors to provide a higher level of assurance on the financial statements when Big Data allows for an audit of populations. However, the provenance and the veracity of Big Data is still in question. The present study examines the quality of audit evidence when auditors present unqualified opinions based on that evidence using Big Data during the audit engagement. It studies the change in the user's perception of the level of assurance they perceive from the audit engagement done using Big Data technology. It also emphasizes the need for various future research in this field.

Accountants and audit professionals hold themselves with high standards of accuracy and fair representation of financial statements. In the modern audit engagement revolution, these professionals are under immense pressure to integrate technology with accounting tools to fulfill the demands of their clients, who are quickly moving towards Big Data for their day-to-day operations. There still lies the risk of a knowledge-gap between the technical side of Big Data and existing knowledge of traditional auditors, who are not prepared to deal with emerging technologies. Big Data analytics offers insights into a knowledge-gap between technology and accounting that needs to be addressed. This paper looks at Big Data by examining the following questions:

1. Does studying the whole population reduce sample risk?
2. If auditors use populations to express an audit opinion with the help of Big Data, keeping into consideration that provenance and veracity of Big Data are still difficult to state, should their level of assurance increase?
3. Should auditors continue to sample during an audit, and use agreed-upon procedures to express a separate opinion when auditing populations that use Big Data? If so, should the agreed-upon procedure continue to be offered at a “relatively positive limited assurance” or should it be higher than the reasonable assurance offered by a standard audit?
4. How should the standards should be revised to allow auditors to adapt to these upcoming technological changes?

### **Significance of and Rationale of this Paper**

This study is crucial research in the public accounting service sector. With the advent of data-driven technology, corporations have become aggressive in adopting Big Data and analytics in their core businesses. It has been of paramount importance for corporations to gain a competitive advantage in the global business environment. These corporations are collecting a massive amount of data from various sources, like social media, point-of-sale, internet of things (IoT), and processing, and uploading them to the cloud (Appelbaum, et. al 2017). Now, the auditors who are qualified in auditing clients' financial documents, risk assessment, and advisory services face a different set of problems (Yudintseva 2015). They perform auditing using traditional procedures of

inspecting the client's datasets, which are paper-based. In recent years, computer-based data have become very frequent, and auditors must deal with a massive amount of data in a variety of formats. Whether to use Big Data while performing an audit for the clients who have already adopted this technology is an issue that is widely discussed among industry professionals (Appelbaum, et. al 2017). Similarly, is it worth it? What are the trade-offs between costs and outcomes?

### **Hypothesis**

This research hypothesizes that the integration of Big Data is beneficial to auditing. It reduces the sample risk and provides population examination of financial transactions rather than just relying on samples. Also, it is assumed that users will perceive a greater level of assurance if financial statements are audited by external auditors using Big Data analytics during the audit engagement.

### **Understanding the Risk posed by Big Data**

When adopting Big Data by auditors, several challenges need to be considered. One major challenge is the verification of information provided by clients. Additionally, clients store their transaction data in the cloud, which is not necessarily pristine. The original form of data is altered while transmitting those data from clients' servers to the cloud. They do not have any digital signatures that confirm the lineage of those data (Appelbaum, et. al 2017).

This paper examines a broad scenario that auditors face. Would they be able to provide a higher level of assurance if they examine the population using Big Data and Big Data analytics, which eliminates the risk of sampling? (Hasan 2005) What are the

other possible research questions that, if answered, can help auditors and other professionals fill the knowledge-gap between the technology and accounting profession?

## **CHAPTER 2: LITERATURE REVIEW**

### **1. Background: Big Data and Data Analytics**

#### **1.1. Big Data**

In the context of accounting and auditing, Big Data refers to the amount of data stored or processed at or beyond the limit of relevant information systems. It is comprised of large datasets, which include different forms of data, that can be analyzed to see trends, patterns, and assumptions (Vasarhelyi, et. al 2015). Due to advancement in technology and types of data availability, Big Data possesses an enormous significance in both accounting and auditing practices. However, it includes datasets that are too large and complex to analyze with the existing tools and technology. In other words, the analysis of Big Data is so complex to analyze and manipulate that all existing tools, like CompStat, CRSP, and audit analytics, have failed to serve their purpose (Cao, et. al 2015). It is a very new concept with many complexities yet to be understood.

Big Data was originally introduced after the advancements in technology during the early twenty-first century. It is often described using very vague terms because of its varying interpretations across the different areas of its applications. Besides, the perception of Big Data for a small firm can be very different from that of a larger firm (Vasarhelyi, et. al 2015). Apart from the size of a firm, the meaning of Big Data can vary across different industries. For example, Big Data defined by an auditing firm might not be the same as defined by a medical research center.

Big Data is changing not only accounting practices, but also auditing practices. Nowadays, a vast amount of transactional data is created and recorded in the company's database. At the granular level, it is important to analyze each dataset and determine its

materiality for reporting and disclosure. While auditors are challenged with assuring these large digital datasets, the current set of auditing standards is still based on physical data. There is an immediate need to update accounting and auditing standards to match the need of the current data realm. If audit standards are changed to satisfy the availability of more continuous, automated, and population-level techniques of auditing, then the audit will become more effective, reliable, and standardized. Similarly, the need for assuring data is continuously changing. The paper-based sampled data were limited in size and easy to validate, whereas the constantly updating digital datasets are huge in size, and difficult to validate. The advent of Big Data has also challenged auditors' competencies. Auditing standards regarding the auditors' competencies have not been updated since 1975, which does not refer to the ever-changing auditing practices in a data-dominated society (Kraheil and Titera 2015). These standards must be updated to accommodate the coming changes.

## **1.2. Big Data Analytics**

Big Data analytics is an advanced analytical tool that inspects, cleans, transforms, and models huge datasets to extract useful information and draw patterns and trends to suggest prescriptive steps for decision making (Cao, et. al 2015). After the emergence of this technology, data is being created every moment from every possible source, in a process referred to as datafication, and stored at different places, such as in-house enterprise systems, cloud storage, and so on. Datafication is the process of creating, recording, measuring, and capturing anything that is digitally recognizable (Cao, et. al 2015). It includes every transaction in a company, camera recordings, social networking posts, tweets, and many other forms of digital data like text, audio, and video. Big Data



tracks all these data in real-time and offers the potential to analyze the dataset using relevant analytic tools (Cao, et. al 2015).

In today's data-dominated environment, accountants and other decision-makers are challenged to analyze a huge amount of complex data to draw useful information. Accountants are using data analytic tools for different purposes within the various domain of accounting practice, like financial, managerial, audit, tax, and fraud detection (Schneider, et. al 2015). For example, one of the most common uses of data analytics in accounting is in forensic integrity tasks. Forensic accountants are using varieties of structured data like transaction information as well as unstructured data like call recordings, emails, and video recordings, to detect fraudulent activities.

The development of data analytics is significantly changing the “infer, predict, and assure” tasks performed by accounting professionals (Schneider, et. al 2015). For example, accountants are using data analytics to infer operational efficiencies, to predict tax liabilities and future sales revenue, and to provide assurance by flagging risky transactions.

### **1.3. Big Data and Accounting**

One of the biggest impacts of Big Data in both financial and managerial accounting is its ability to access real-time data and create reports based on real-time data. In traditional accounting practices, most of the data used to measure the market value of different accounts of financial reports were either inaccurate or outdated. Intangibles, first-in-first-out (FIFO), last-in-first-out (LIFO), measurements of historical costs, and estimation of annual depreciation are measured using different formulas and assumptions which are not accurate most of the time (Vasarhelyi, et al 2015). In contrast,

current technology gives the possibility of getting real-time data and make calculations and estimations of value with a greater level of accuracy. Different forms of data complement traditional financial information which can provide additional evidence for assurance and improved transparency. The ERP (Enterprise Resource Planning) system contains useful information about the assets of a company that can be used to supplement other data such as video recordings, phone calls, email messages and so on, to obtain a comprehensive view of each asset's condition, features, and attributes. Annual depreciation, once estimated using different assumptions and variables, can now be obtained by current value comparisons across time (Warren, et. al 2015).

Moreover, the value of inventory in traditional accounting, was measured using different valuation-techniques and physically counting each item. However, with the technology-enhanced accounting data (Big Data), the current value of inventory held is available in real-time. Using Big Data technology, organizations are collecting data from various sources in the real-time, i.e. at the point-of-sale (POS), which has facilitated increased data analysis applications including inventory control and detecting related products. For example, a vendor managed inventory system is one of the applications based on accessibility introduced by big data. Nowadays, big corporations are using various types of financial and non-financial data to prepare more sophisticated reports for the management to make a better decision for process improvements and project management. Moreover, they are using various databases to replace historic values in balance sheets with fair market value resulting in more sophisticated and accurate decisions.

Similarly, managerial accounting has gained significant popularity in recent years due to an increase in large scale corporations with billions of dollars in operating costs and a massive amount of data in their enterprise system. Corporations are investing significant resources in creating systems like management control systems (MCSs) and Balanced Scoreboard (BSC) which will regulate management and employee behaviors and identify financial and nonfinancial measures for behaviors that best fit with business objectives (Warren, et. al 2015). Companies, who are using MCSs, are using Big Data to measure employee behaviors for internal control. There are many ways to monitor employee activities to measure their productivity. For example, information extracted from employees' computers contains data on web use, click streams, and time spent using productivity software like MS Excel (Warren, et. al 2015). Moreover, Big Data also helps in revealing various trends, patterns, and demand forecasts which also helps in the budgeting process of the company.

#### **1.4. Big Data and Auditing**

Auditing is a systematic and disciplined approach designed to examine an organization's financial records to make sure they are accurate and in accordance with the standards. It evaluates and improves the effectiveness of processes and related controls to safeguard investors' financial interest in an organization (Ruppert). Traditionally, auditing was performed by verifying physical receipts or counting inventory periodically, such as monthly, quarterly, and annually. These were both time-consuming and inaccurate. Only the financial aspects of business transactions were audited and used for decision-making purposes. But, the paradigm of audit has shifted. Relying on a limited amount of paper-based data is not sufficient and relevant anymore.

Data of larger size and expanding sets of variables are automatically created and stored using different devices like scanners, RFID (Radio-frequency identification) chips, mobile apps, and so on. The increase in size and complexity of data poses serious challenges in auditing (Vasarhelyi, et. al 2015). The audit and assurance provided by auditors using the traditional approach are putting audit at risk of becoming less relevant, because of auditors' incompetence to audit and validate the contents of Big Data (Zhang, et. al 2012).

In the Big Data business environment, auditors are exposed to an enormous amount of data to verify the data's relevance and reliability (Titera 2013). Large public accounting firms and corporations are using advance data analytical tools to leverage all the data available to them. With the right tool and access to enterprise data, auditors are able to examine the entire population of the data. Big Data supported analytical tools do not just examine the entire population of available data, but also incorporate other unstructured data to establish a relationship between every data examined and draw useful insights from them. For example, data analytic tools can analyze entire financial data at different dimensions like date, time, purpose, transaction types, transaction value, business type, customer type, geography, standards-based and so on (Titera 2013). Also, this analysis can be applied at a higher and complex level using data from other sources, such non-financial data like emails, call-recordings, social networking sites, browsing histories, and so on.

The greatest advantage that data analytics provides over simple analytical procedures is its ability to assess risks, identify anomalies, and detect errors (Titera 2013). Unlike traditional audit practices, the technology-enabled audit comes with a

higher quality of audit evidence, which is derived from many new sources, including big data, exogenous data, the ability to analytically link different processes, database-to-database confirmation, and continuous monitoring alerts (Titera 2013).

## **2. Audit Standards**

This section briefly discusses current audit standards that provide guidelines for audit evidence, sampling, and analytical procedures.

### **2.1. Audit Evidence**

The main purpose of an audit engagement is to provide reasonable assurance to the clients that the management prepared financial documents are fairly presented and are in accordance with GAAP (Appelbaum, et. al 2016). To provide reasonable assurance, auditors collect audit evidence from internal and external enterprises (Appelbaum, et. al 2017). Based on the outcomes of the analysis, auditors provide their opinion with the audit reports. There are several set guidelines prescribed by the audit standards; auditor must perform audit engagement in compliance with those standards. The audit standards require auditors to collect sufficient evidence and examine physical evidence as a part of the risk assessment process. Similarly, it also requires auditors to measure the quality of audit evidence, *i.e.*, its relevance and reliability (PCAOB 2010A).

The relevancy of audit evidence is determined by its usefulness in the verification of the assertion (PCAOB 2010B). For example, collecting records from the warehouses can help auditors make sure about the valuation of inventory at the year-end, which makes those records relevant for determining the inventory valuation. Relevancy is not

enough for the accuracy of audit evidence unless it is reliable. The reliability refers to the trustworthiness of the source of the audit evidence.

## **2.2. Sampling**

Current auditing standards are too outdated to address the needs of the required audit engagement in the prevailing Big Data based economy. Corporations are creating and storing massive amounts of data every second leaving auditors inundated with transactions sampling and verification process. Current auditing standards do not address the need for steady and complete analyses of the available data (Krahel 2015).

Accounting Unit (AU) Section 350 (PCAOB 2011) deals with statistical and non-statistical sampling and the inherent uncertainties and personal judgment inherent in such technologies. An excerpt from Paragraph 7 of this standard (PCAOB 2011) illustrates the undermining nature of sampling use in audit and the corresponding standards that govern it.

*Some degree of uncertainty is implicit in the concept of “a reasonable basis for an opinion” referred to in the third standard of fieldwork. The justification for accepting some uncertainty arises from the relationship between such factors as the cost and time required to examine all of the data and the adverse consequences of possible erroneous decisions based on the conclusions resulting from examining only a sample of the data. If these factors do not justify the acceptance of some uncertainty, the only alternative is to examine all of the data. Since this is seldom the case, the basic concept of sampling is well established in auditing practice. (PCAOB 2011, paragraph 7)*

It is apparent from this standard that current audit standards are not sufficient to provide reasonable level of assurance to the users of the financial statements. When auditors are performing audit engagements at the firms that have terabytes of data to deal with, auditors are left with deficient tools to deal with verifying the available data. Those responsible for ensuring that auditing standards are up-to-date and sufficient to address

current needs have not been able to do so. There are no set standards that recognize the challenges posed to the auditors in this digital economy. With a massive amount of data, auditors have no prescribed guidelines and standards on how to address different problems arising from processing massive datasets. There are no standards that guide how to handle inherently riskier data sources, data accuracy, data manipulation, and so on. With the rise of Fintech and online enterprises, the risk of fraudulent transactions is mounting serious threats to the accuracy of audited documents which are solely based on sample testing. For instance, fraudulent online sales receipts created to meet earnings or to manipulate the timing of the transaction can easily go under the radar of sample testing because it is impossible to track millions of online sales transactions is quite impossible to track through sampling. In this scenario, accommodating standards to facilitate population testing using Big Data analytics and various synonymous technology can help auditors perform substantive tests on one hundred percent of the data, thus increasing the quality of audit opinions.

Besides, in the Big Data business environment, data is ubiquitous. It comes in different forms and a huge volume. Processing these data to get useful insights does not always give exact answers. It offers various insights, patterns, and details, but lacks exactness, which the current standards recognize. When it comes to employing huge datasets and analytics tool for auditing and attesting, audit standards need to be updated to allow the recognition of inexact results. We need to shift our mindset from total validation to tolerating a lack of exactness.

### **2.3. Analytical Procedures**

Auditing Standards (AS) 2305.02 (PCAOB, 2010C) defines Analytical Procedures (APs) as an “important part of the audit process that consists of evaluations of financial information made by a study of plausible relationships among both financial and nonfinancial data.” An auditor develops certain expectations about a particular assertion and then compares the results of the recorded amounts in the financial data. Analytical procedures are mainly applied on sample sets of data to perform substantive testing of assertions. However, it is not recommended when the sample size is small or not representative of the whole population (PCAOB 2010D). Big data technology can provide a substantial amount of resources to automate the analytical procedure while allowing auditors to apply analytical procedures to the whole population.



## CHAPTER 3: METHODOLOGY

The survey questions were developed to address the primary research question inquired in this paper, “How will the level of assurance perceived from financial statements that are audited by external auditors be changed if Big Data and Analytics are used during the Audit engagement?” The response categories were “increased,” “remain the same,” and “decrease.” The survey also included other questions to measure the understanding of the subject matter in question. Given the fact that accounting and finance professionals have recently become aggressive regarding emerging technologies’ integration into accounting and audit, this survey was designed to collect the opinion/perception of accounting/finance professionals working in a range of firms, in terms of size and services offered.

The survey was delivered through Qualtrics software to CPAs, bankers, CFAs, and other finance professionals working in several states in the United States. The survey was sent to three different groups: A, B, and C. Group A subjects were selected randomly from the list of registered CPAs, CFAs, bankers, and other professionals in the state of their practice. Group B subjects were the professionals in my LinkedIn connection. The survey link was posted on LinkedIn to reach out to a wider mass of professionals working in related fields. Finally, group C subjects were the members of the University of Southern Mississippi College of Business and Economic Development’s School of Accountancy Advisory Board Committee members. These members are the professionals working in the Finance and Public Accounting industry. The survey did not offer any kind of incentive, such as gift cards, cash or any other cash-equivalent rewards. It also included a question to check the attention of the subjects. The survey question read as,

“Please choose ‘Satisfactory’ for this field.” Respondents who checked a different answer to this question were disqualified from the survey results.

<b>Table 1: Survey Composition</b>		
<b>Survey Groups</b>	<b>Number of Potential Participants</b>	<b>Description</b>
Group 1	120	a random sample of CPAs, bankers and financial analysts
Group 2	202	LinkedIn post accessible to CPAs, and finance professionals
Group 3	30	School of Accountancy's Advisory Board Committee members comprised of accounting and finance professionals

Table 1 describes the constituents of the potential survey takers. Similarly, table 2 describes the demographics of the subjects of the survey. Due to an ineffective survey mechanism, only 11 responses were received within a time frame of 3 weeks. The reasons for fewer responses might be unresponsive subjects in the sample, timing (busy tax season), and the breakout of Covid-19. Due to fewer responses, I have decided to keep this study as a pilot program.

<b>Table 2: Sample Demographics</b>		
	<b>Number of Respondents</b>	<b>Percent</b>
Louisiana	1	9%
Mississippi	10	91%

## CHAPTER 4: RESULTS

The results of the survey corroborated the hypothesis of this research paper. A series of questions were asked in the survey to confirm the subjects' eligibility to participate in the survey and have their answers included in the study. According to the survey data, 100 percent of the subjects were accounting and/or professionals. They were able to understand the essence of this study and the topic in question. Out of all the participants, approximately 91 percent of the respondents use various types of accounting reports daily, and 9 percent weekly (Q2, Table 3). The original survey is provided in the appendix at the end of this paper.

There was another question in the survey that asked the subjects about their familiarity with the concept of Big Data and on its impact on accounting (Q7, Table 3). Sixty percent of the respondents had a good understanding of the concept of Big Data, and only 30 percent had a smaller than average understanding of Big Data. Since, Big Data is relatively a new concept, 70 percent of accounting or finance professionals' familiarity with Big Data concepts is comparatively a great result.

Next, these respondents were asked, "In your opinion, how likely will the accuracy of audit engagement improve assuming Big Data is integrated into the Audit process?" Out of all the respondents, 87.5 percent of the subjects said it is likely that the accuracy of audit engagement will improve assuming Big Data is integrated into the Audit process. The rest of the 12.5 percent of the subjects were neutral in their opinion. Therefore, 87.5 percent of the respondents believed that Big Data can increase the accuracy and efficiency of audit engagement (Q10, Table 3).

In the current audit scenario, audit evidence is selected based on a sampling of the data which poses a serious risk on the quality of audit evidence. Large corporations have millions of sales transactions daily. There is a bigger risk of selecting a misrepresentative sample which might affect the chances of discovery of fraudulent sales transactions. Big Data technology provides the potential of whole population testing which improves the quality of audit evidence collected during the audit engagement. It does not only increase the accuracy of financial statements but also safeguards investors' interests. The participants in the survey were asked, "How likely will Big Data technology improve the quality of audit evidence?" A quarter of the respondents said it is extremely likely that the quality of audit evidence will improve, and 62.5 percent of the respondents said it is somewhat likely (Q11, Table 3). None of the respondents said it is unlikely that the Big Data technology will improve the quality of audit evidence collected during the audit process.

After asking a series of questions, the respondents were asked the question that answers the thesis of this paper. At the end of the survey, the participants were asked two questions: 1.) How will the level of assurance perceived from financial statements that are audited by external auditors be changed if Big Data and analytics are used during the Audit engagement? and 2.) How positive were you when answering if the level of assurance will change? The answer to the first question was: 70 percent of the respondents believed that the level of assurance will increase, and 30 percent believed it will remain the same. Out of all the respondents, 80 percent of the respondents were positive (confident) about their response to the first question whereas 20 percent were neutral to their response (see Questions 13 and 14 in Table 3).

## **Recommendations: Steps to be Taken to Ensure the Quality of Audit Evidence**

How can we address the growing concerns about the integration of Big Data and other technological applications in accounting and audit profession? Here are a few recommendations that I think will help oversight bodies and standard setters to address auditor competence and related standards.

1. Audit standards should be updated
2. New guidelines need to be pronounced regarding data management
3. New technologies need to be developed to address the veracity issue of data
4. Education requirements of professionals should be modified
5. Public accounting firms should focus on the development of process audit

## **Future Research Needs**

Big Data is a new concept, and thus, requires more extensive researches to support the industry professionals' assumptions and expectations about Big Data technology, and its reliability. Here are a few research topics to begin with. These questions might help answer few of the most important issues in the accounting profession:

1. Does studying the whole population reduces sample risk?
2. Should auditors continue to sample during an audit, and use agreed-upon procedures to express a separate opinion when auditing populations that use Big Data? If so, should the agreed-upon procedure continue to be offered at a “relatively positive limited assurance” or should it be higher than the reasonable assurance offered by a standard audit?

3. How the standards should be revised to let auditors allow to adapt to these upcoming technological changes?

**Table 3: Summary of Outcome Analysis**

	<b>Questionnaire</b>	<b>Number of responses</b>	<b>Percent</b>
Q2	How frequently do you use Accounting reports, such as income statements, balance sheets, and so on?		
	Daily	10	90.91%
	Once a week	1	9.09%
Q7	How familiar are you with Big Data and its impact in Accounting?		
	Good	6	60%
	Average	1	10%
	Satisfactory	2	20%
	Poor	1	10%
Q10	How likely will the accuracy of audit engagement improve assuming Big Data is integrated into the Audit process?		
	Extremely likely	2	25%
	Somewhat likely	5	62.50%
	Neither likely nor unlikely	1	12.50%
Q11	How likely will Big Data technology improve the quality of audit evidence?		
	Extremely likely	2	25%
	Somewhat likely	5	62.50%
	Neither likely nor unlikely	1	12.50%
Q13	How will the level of assurance perceived from financial statements that are audited by external auditors be changed if Big Data and analytics are used during the Audit engagement?		
	Increase	7	70%
	Decrease	3	30%
Q14	How positive were you when answering if the level of assurance will change?		
	Extremely positive	2	20%
	Somewhat positive	6	60%
	Neither positive nor negative	2	20%

## **CHAPTER 5: CONCLUSIONS**

The hypothesis of this research paper held up with the outcome of the pilot study conducted and summarized above. The hypothesis was that the sample risk will decrease, and users of financial statements will perceive a higher level of assurance if big data is integrated to the audit engagement process. However, the number of responses was not large enough to substantiate the hypothesis and bring strong evidence in favor of this study. The problem with the survey was a small sample size and a lack of responsive participants in each sample. Another reason was the timing of the survey distribution. The survey was sent during the year-end and busy tax season when most of the accounting professionals are busy with preparing taxes and annual reports. The breakout of Covid-19 crisis was another major factor.

I would like to continue this research during my graduate school by improving all the weaknesses and assertions in this paper to make a more comprehensive and appealing paper in this field.



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## Appendix A: Surveys

1. Are you an accounting/finance professional who works with Financial reports?

Yes

No

2. How frequently do you use Accounting reports, such as income statements, balance sheets, and so on? (Note: to use means to prepare, to audit, or to make a decision)

Daily

4-6 times a week

2-3 times a week

Once a week

Never

3. In which industry sector do you work?

Public Accounting

Financial services

Manufacturing

Retail

HealthCare

Other \_\_\_\_\_

4. How many years of experience do you have in the respective sector?

\_\_\_\_\_

5. In which country do you currently reside?

▼ United States of America (187) ... Zimbabwe (1357)

6. If the United States, then which state do you currently reside?

▼ Alabama (1) ... I do not reside in the United States (53)

7. How familiar are you with these terms concerning Accounting/Finance?

	Excellent	Good	Average	Satisfactory	Poor
Big Data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Analytics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It Audit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please choose "Satisfactory" for this field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automated Auditing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuous Process Audit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Do you have an active Certified Public Accountant (CPA) license?

Yes

No

9. How do you identify yourself in your profession?
- Someone as who audits or prepares financial statements
  - Someone as who uses financial statements for decision making
  - Both of the above
  - None of the above
10. In your opinion, how likely will the accuracy of audit engagement improve assuming Big Data is integrated into the Audit process?
- Extremely likely
  - Somewhat likely
  - Neither likely nor unlikely
  - Somewhat unlikely
  - Extremely unlikely
11. How likely will Big Data technology improve the quality of audit evidence?
- Extremely likely
  - Somewhat likely
  - Neither likely nor unlikely
  - Somewhat unlikely
  - Extremely unlikely
12. Which of the following method will produce better results when examining financial transactions?
- Whole Population examination using Big Data
  - Sampling

13. In your opinion, how will the level of assurance perceived from financial statements that are audited by external auditors be changed if Big Data and Analytics are used during the Audit engagement?

- Increase
- Remain the same
- Decrease

14. How positive were you when answering the previous question?

- Extremely positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Extremely negative

## Appendix B: IRB Approval

Office of  
Research Integrity



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### NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER: IRB-20-16

PROJECT TITLE: The Impact of Big Data on the Quality of Audit Evidence and Level of Assurance

SCHOOL/PROGRAM: School of Accountancy, Accounting / MPA

RESEARCHER(S): Sachin Yadav, Marvin Bouillon

IRB COMMITTEE ACTION: Approved

CATEGORY: Expedited

7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: February 5, 2020

*Donald Sacco*

**Donald Sacco, Ph.D.  
Institutional Review Board Chairperson**