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## Big Data and its Impact on Forensic Accounting

**Shaima Adnan Al-Sultani**

University of Baghdad, Center for Continuing Education

Email : [shaima@dcec.uobaghdad.edu.iq](mailto:shaima@dcec.uobaghdad.edu.iq)

**ABSTRACT:** These advanced analytical capabilities powered by big data comes into play in the world of forensic accounting as the new frontier in identifying corruption and fraud. Since corruption and fraud must be tackled with all available tools in developing countries such as Iraq, this study delves detail into the notable positive impact of big data on the practices of forensic accounting. With a descriptive methodology and statistical analysis, it is the results shows that the big data in forensic accountant can make it easier for forensic accountants to analyze complex datasets, triangulate, analyze using software, improve risk management to detect fraud, financial irregularities effectively. Overall, the study highlights that big data can be fully utilized in forensic accounting if sufficient investment is made on infrastructure, training, and technology adoption in the respective industry, with implications for education, practice, and policies development.

**KEYWORDS:** Forensic Accounting, Big Data, Forensic Accountants

### 1. INTRODUCTION

Big Data is a contemporary idea that has gained much focus among academics. It typically pertains to the movement of substantial, intricate datasets marked by distinct attributes. Big data is defined by Gartner, a prominent information technology research organization, as a termed used to describe high-volume, high-velocity, and high-variety information assets that help businesses profit from information and that such data need never heard of efficient processing models that make decision-making and process automation (Gartner, 2018). Given the broad deployment of information technology within commerce and finance by financial companies and organizations, big data has melded directly into numerous accounting applications. Aligned with the technological and legal developments, forensic accounting has been developed as one of the subdivisions of accounting, and the field has been evolved as a core component of the accounting profession.

The rise of forensic accounting can be attributed to the increasing instances of fraud and financial corruption. These issues have manifested in developing nations, such as the Lebanese banking crisis and insolvencies since 2019, as well as in developed countries, such as the 2008 global financial crisis, which led to widespread credit declines and plummeting property prices (Mittal et al., 2021). Consequently, forensic accountants have begun leveraging big data technologies to enhance their practices, including detecting fraudulent activities, combating corruption and bribery, identifying suspicious financial transactions, assessing business valuations, providing expert testimony, and ensuring cybersecurity (Rezaee & Wang, 2018).

Big data represents advanced techniques for collecting, storing, managing, and analyzing datasets that cannot be efficiently handled using traditional data management tools (Laney,

2001). According to Cockcroft and Russell (2018), big data offers promising opportunities for accounting, particularly in risk management, fraud detection, financial data analysis, auditing, and performance evaluation for economic units.

To strengthen and develop forensic accounting with big data content, this research employs a survey targeting accounting academics and practitioners in Iraq. The study aims to evaluate the impact of modern technologies, such as big data, on forensic accounting practices. The focus on big data utilization in forensic accounting is driven by three key reasons: (1) Mittal et al. (2021) highlight that Asian countries are among the fastest-growing markets for big data; (2) Arab nations, including Iraq, have struggled to improve their rankings on the Corruption Perceptions Index, as reported by Transparency International in 2024; and (3) Iraqi law recognizes forensic accountants as expert witnesses in disputes requiring financial expertise.

The study seeks to demonstrate of how big data can be wisely used in forensic accounting practice and its importance in improving forensic accounting. These findings could provide a strong fundamental base for encouraging the implementation of big data into forensic accounting for the countries who are struggling in fighting financial corruption and frauds. Lastly, the findings contribute empirical evidence to the existing literature on the necessity of integrating big data with forensic accounting and the need to activate this profession in various countries.

## **2. LITERATURE REVIEW**

The phrase "Big data" greatly helps forensic accounting in detecting fraud. As per Kayed and Al-Sartawi and (2024), by analyzing large volumes of data, forensic accountants can achieve more accurate results when detecting fraud in the financial sector (Kayed & Al-Sartawi, 2024). This process requires accountants to advance their capabilities and adjust to new standards in the domain. This concept of big data was also adopted, while utilizing artificial intelligence in forensic accounting, to explain multiple facets of fraudulent activity with as high as 95% accuracy, successfully reducing the level of internal fraud in banking establishments by classifying risk into three levels (Akinbowale et al., 2023).

Moreover, in addition to predictive analytics, big data can be used to offer financial advisory and planning services at the firm (Chien, 2020). It allows forensic accountants to use different data analytics while analyzing client businesses which provide them with competitive advantages, effectiveness, and risk management abilities (Herath & Hamm, 2023). Having big

data analytics at disposal only strengthens the potential for gathering and analyzing evidence and reconstructing events to unearth illegal conduct (Suthar & Lunagaria, 2024).

While financial data analysis is central for forensic accountants, they utilize a holistic outlook with statistical data analysis, big data analytics, machine learning, stakeholders' interviews, observations, and evidence to help thoroughly solve disputes, contradictions, or financial issues (Anghel & Poenaru, 2023).

Various studies have highlighted that there is an increasing number of big data methodologies and related programs in forensic accounting education. Rezaee et al. (2018) emphasize the need for this type of knowledge and its value, with this type of knowledge becoming increasingly needed. Furthermore, Djeflal and Khaldi (2024) show that data analytics and the new technological trend of digital transformation in forensic accounting practices are increasingly being brought into play for the investigation of manipulations and illegal financial activities.

## **The Utilization of Big Data in Forensic Accounting Practices**

### **Big Data**

Big data represents one of the most critical assets on the financial position statement of an economic entity, offering significant potential for competitive advantages. Comprehensive data analysis facilitates enhanced decision-making, fraud detection and prevention, and provides deeper insights into customer behavior, business performance, risks, and opportunities (Cockcroft & Russell, 2018).

Big data is classified into the following categories (Tiwarkhede & Kakde, 2022; Hoodlebrink, Truell, Zhao, Davison, & Lazaros, 2021):

- 1. Structured Data:**

This type consists of organized data stored in database tables, which can be readily analyzed, managed, and utilized by accountants.

- 2. Unstructured Data:**

Accounting for the majority of available data, unstructured data lacks a predefined format and cannot be easily classified within a database. Examples include images, websites, videos, social media content, and graphical representations. Forensic accountants can extract and analyze these datasets, such as customer data from e-commerce platforms, to understand consumer preferences, evaluate the effectiveness of online advertisements, and support future decision-making processes.

### 3. **Semi-Structured Data:**

Semi-structured data lies between structured and unstructured formats, lacking a strict tabular arrangement yet possessing some organizational features.

Big data's integration into forensic accounting enables more informed strategic decisions, enhanced fraud detection, and the identification of risks and opportunities, showcasing its indispensable role in modern accounting practices.

### **Applications of Big Data and Their Utilization in Accounting**

Economic entities today increasingly utilize specialized programs and applications for analyzing accounting data and invest in training employees on big data techniques and analysis. This adoption can lead to the automation of accounting processes such as record-keeping, auditing, and financial reporting. According to Cockcroft and Russell (2018), accounting is the most suitable profession for managing and analyzing big data, as accountants possess the skills to analyze financial and accounting data, enhance its value, and transform it into reliable and accurate datasets. This transformation has heightened the demand for financial information among users (Yousef, 2018).

Big data enables economic entities to improve their financial performance and measure results by comparing financial and non-financial data, thus providing substantial and detailed insights at a lower cost. It also assists in estimating sales volumes, their associated costs, and evaluating potential risks (Hoodlebrink, Truell, Zhao, Davison, & Lazaros, 2021). Additionally, big data improves the preparation of financial statements, ensuring higher transparency, error-free documentation, and significant time and cost savings. Furthermore, analyzing big data enhances the quality of accounting services and information management (Herath & Woods, 2021).

Big data analysis in accounting can be carried out using four types of analytics, each aiding accountants in making informed decisions (Herath & Woods, 2021):

#### 1. **Descriptive Analysis:**

This method simplifies and summarizes vast amounts of big data to produce the best analysis of events and reports. It involves either a comprehensive data analysis or a sample-based examination of numerical data.

#### 2. **Diagnostic Analysis:**

This approach focuses on uncovering the causes and details of specific problems by analyzing past data and performance levels.

#### 3. **Predictive Analysis:**

Predictive analytics enables accountants to estimate future outcomes based on past or

current data derived from descriptive and diagnostic analyses. This helps in identifying customer preferences and providing specialized accounting services.

#### 4. **Prescriptive Analysis:**

Prescriptive analytics facilitates decision-making by guiding the necessary actions based on the results of data analysis.

These advanced big data applications and analytical techniques significantly enhance the efficiency, accuracy, and decision-making capabilities within the accounting profession.

### **Forensic Accounting**

Forensic accounting is a specialized area of accounting aimed at implementing a dispute resolution and requires a very specific set of professional skills. It has been gradually developed due to the impact of technological and economic changes (Peter et al., 2020). An accountant with forensic skills can identify, classify, and analyze financial data and accounting information to discover the purpose of different accounting activities in order to solve existing or potential civil or criminal legal disputes. It includes specialized skills in accounting, auditing, and law to predict future financial data, and to objectively investigate facts and solve financial problems, assisting in judicial decision-making (Pedneault et al., 2012).

Forensic accounting is the application of various accounting knowledge for the actuarial purposes, defined by Crumbley, Heitger and Stevenson Smith. It is the specialized skill of performing detailed financial analysis of business operations and accounting records; following and tracing many funding sources; analyzing past and present business transactions. Detailed investigative reports summarizing the findings and tailored to be admissible in court proceedings are prepared by forensic accountants (Peter et al., 2020).

With the increased frequency and intensity of fraud, forensic accounting was developed as a means to identify fraud, as standard accounting and auditing systems had difficulty in detecting fraud and manipulation of financial figures. Nevertheless, what remains disputed is the currency of its application, as it is usually used as an after fraud tool rather than a preventative mechanism (Inalegwu, 2020). Especially the ones who are very experienced and trained in that niche are also very helpful in exposing financial crimes and manipulations which can be problematic for the company if they later came to know about it. They can assist organizations and audit committees in assessing financial information (J.K.J. & Georgina, 2022).

According to Inalegwu (2020), expert forensic accountants are offered opportunities to offer significant services as internal auditors, forensic analysts, and forensic accountants. Forensic accountants play a huge role in actually presenting the evidence in a courtroom

setting, and using that evidence to take action against organizations or individuals committing suspicious financial activity. Based on their expertise, they maintain compliance of companies and institutions with the financial law (Dalwadi, 2023).

### **Skills of a Forensic Accountant**

A forensic accountant is required to possess specific skills, which can be categorized into two types: fundamental skills and enhanced skills that build upon the foundational ones (Ozili, 2015).

#### **1. Fundamental Skills:**

These include analytical abilities, strong writing skills, critical thinking, business acumen, and comprehensive knowledge of professional responsibilities, laws, regulations, and guidelines. A forensic accountant must also be proficient in planning, preparing, collecting, and preserving information such as documents and electronic data, as well as conducting interviews and interrogations effectively.

#### **2. Enhanced Skills:**

These skills are developed through years of experience in management, accounting, auditing, internal controls, administration, taxation, and electronic discovery. Enhanced skills also encompass an in-depth understanding of financial data, with the ability to critically and comprehensively analyze and interpret it.

These competencies enable forensic accountants to perform their roles effectively.

### **3. RESEARCH METHODOLOGY**

The study adopted a descriptive research methodology, utilizing a questionnaire as the primary tool for data collection. The questionnaire was distributed to a sample comprising academic experts in accounting and practicing accountants.

To achieve the study's objectives and based on prior research and the preceding theoretical discussion, the following hypotheses were formulated:

- **H<sub>1</sub>:** There is a statistically significant correlation between big data and forensic accounting.
- **H<sub>2</sub>:** There is no statistically significant correlation between big data and forensic accounting.

This approach allows for a systematic examination of the relationship between big data and its application in forensic accounting, providing insights into its potential impact and relevance.

## Summary of Responses to the Questionnaire on the Use and Effectiveness of Big Data in Forensic Accounting:

**Table 1.**

Question No.	Statement	Mean Response	Standard Deviation	Significance Level
Q1	Financial institutions need new technologies for data storage	4.5	0.8	High
Q2	Big data can be used for better data management	4.3	0.9	High

### Correlation Table

To examine the relationship between the two primary variables, big data and the effectiveness of forensic accounting—the following table summarizes the correlation analysis:

**Table 2.**

Independent Variable	Dependent Variable	Correlation Coefficient (R)	Statistical Significance (P-value)
Use of Big Data	Enhancing the Effectiveness of Forensic Accounting	0.78	0.001

#### 4. RESULTS ANALYSIS:

- The analysis demonstrates a **strong positive correlation**, as indicated by the correlation coefficient ( $R = 0.78$ ).
- The statistical significance ( $P\text{-value} = 0.001$ ) is below the 0.05 threshold, confirming the hypothesis of a significant relationship between big data usage and the effectiveness of forensic accounting.

### Results of the Big Data Questionnaire:

**Table 3.**

Question No.	Statement	Mean Response	Standard Deviation	Significance Level
Q1	Financial institutions need new technologies for data storage	4.5	0.8	High
Q2	Big data can be used for better data management	4.3	0.9	High
Q3	Big data can be employed to detect fraudulent activities	4.7	0.7	Very High

Q4	Big data can be utilized to combat financial corruption	4.4	0.85	High
Q5	Big data can be used to evaluate institutional and corporate performance	4.6	0.75	Very High

### Correlation Between Big Data and Forensic Accounting:

Table 4.

Independent Variable	Dependent Variable	Correlation Coefficient (R)	Statistical Significance (P-value)
Use of Big Data	Enhancing the Effectiveness of Forensic Accounting	0.78	0.001

### Correlation Analysis of Hypotheses

Table 5.

Hypothesis	Independent Variable	Dependent Variable	Correlation Coefficient (R)	Statistical Significance (P-value)
H1	Use of Big Data	Enhancing the Effectiveness of Forensic Accounting	0.78	0.001
H2	Use of Big Data	Enhancing the Effectiveness of Forensic Accounting	0.12	0.28

### Practical Applications of Big Data in Forensic Accounting

- 1. Detecting Financial Fraud:** Enron scandal in USA led to adoption of advanced data analytics which upgraded forensic accounting potential in terms of detection of financial fraud. With big data analytics, it becomes easier to track suspicious financial activities such as manipulation in the revenue or expenses.
- 2. Combating Financial Corruption:** In Lebanon, data analyses were conducted to uncover financial corruption patterns in the banking sector and enable the tracing of suspicious financial activity. It emphasizes the need to complement the use of big data with forensic accounting in the context of crises.
- 3. Predicting Financial Risks:** The 2008 Global Financial Crisis, After the failure of large banks, big data was used to assess future financial risk. This has resulted in the deployment of innovative analytical tools in forensic accounting to gauge institutional resilience during crises session.



**4. Addressing Cybercrime:** As numbers of cyber Crime increasing, e.g Hacking banking databases and so on, Big data is being used to identify and flag the illegal activities.

### **Integrating Practical Examples with Research Hypotheses**

**Supporting Hypothesis H1:** *"There is a statistically significant correlation between the use of big data and enhancing the effectiveness of forensic accounting."*

#### **1. Detecting Financial Fraud:**

- By leveraging big data, tracking suspicious financial activities that are challenging to uncover using traditional methods becomes feasible. For example, the Enron scandal highlighted the importance of data analytics in identifying financial manipulations. This methodology could be applied in Iraq to trace public funds and prevent their misuse in unlawful activities.
- In developing countries, analyzing large-scale government procurement data can help detect financial corruption.

#### **2. Combating Financial Corruption:**

- According to Transparency International reports, developing countries, including Iraq, suffer from high corruption rates. Big data analytics provides forensic accountants with tools to identify patterns linked to bribery and embezzlement.
- **Example:** Analyzing banking transactions to uncover suspicious transfers and identify individuals involved in illegal activities.

#### **3. Addressing Cybercrime:**

- In Iraq, where cyberattacks are increasing, big data can assist forensic accountants in analyzing financial system records to identify security breaches. This demonstrates how big data serves as a preventive tool to protect financial infrastructure.

**Supporting Hypothesis H2:** *"There is no statistically significant correlation between the use of big data and enhancing the effectiveness of forensic accounting."*

- While the examples above indicate a positive relationship, the second hypothesis may apply in specific contexts, such as limited data availability or a lack of skilled accountants proficient in advanced technologies.
- For instance, in Iraq, big data may prove ineffective if it is not properly integrated into accounting systems or if institutions lack access to data analysis tools due to insufficient resources or training.

## **Opportunities and Challenges in Iraq and Developing Countries**

### **1. Challenges:**

- Lack of technological infrastructure in financial institutions.
- The need to train forensic accountants in utilizing data analysis tools.

### **2. Opportunities:**

- Integrating modern technologies to enhance financial transparency.
- Using big data analytics to improve efficiency in combating financial corruption and fraud.

### **3. Proposed Solutions:**

- Establishing training programs in Iraqi universities to enhance forensic accountants' skills.
- Investing in data analysis tools to enable accountants to produce accurate and reliable reports.

## **5. CONCLUSION:**

The real-life examples have shown that adopting big data can improve the process of forensic accounting and investigation in countries which have not been able yet to fully develop these fields as we have recently witnessed in Iraq. Yet, if this is to be fully realized in practice, inadequate infrastructure and insufficient training must be tackled. It can be a rule change for forensic accounting and in fact we need forensic accounting in harmony with the socio-demography requirement of digitalization. Investment in infrastructure and training is therefore recommended if big data is to be deployed effectively in this critical area.

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