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# The Impact of Big Data Analytics and Forensic Audit in Fraud Detection

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**Abstract.** The high number of fraud cases that occur, causes a large amount of losses to be borne by the company as well as investors and creditors. Based on this, we are looking for an effective method to detect fraud. This study aims to analyze the effect of big data analytics on forensic audits and fraud detection. In addition, this study was conducted with the aim of analyzing the effect of forensic auditing as a mediating variable on fraud detection. This research was conducted using a quantitative approach with a survey method by distributing questionnaires. The respondents of this study are auditors who work in public accounting firms. Statistical testing in this study is in the form of Structural Equation Modeling (SEM) using the smart PLS 3 application. The results of this study indicate that big data analytics has a positive effect on forensic audits. This research also proves that big data and forensic audit each have a positive effect on fraud detection. In addition, this study also proves that forensic audit moderates/strengthens the effect of big data analytics on fraud detection.

**Keywords:** big data, forensic, audit, fraud, detection.

## 1. Introduction

In the era of the industrial revolution 4.0 as it is today, technological developments are becoming increasing rapid. One of the phenomena in industry 4.0 is the development of big data and digitization. This also applies to accounting and financial reporting. Financial reporting no longer uses a manual system that takes a long process, but has used an automated computerized system. However, the development of this technology is also like a double-edged sword. The development of technology also raises new risks and opportunities for fraud cases, in this case fraudulent financial reporting. A lot of cases of fraudulent financial statements occur, and cause losses for stakeholders. In line with the advancement of digital technology, fraud perpetrators are getting smarter in looking for loopholes so that traditional methods of fraud detection fail to prevent it.

Fraud is a deliberate attempt by the company's management to deceive and mislead users of financial statements, by presenting and manipulating the values contained in the financial statements, so that the company's shares remain in demand by investors [1]. The distinguishing factor between error and fraud is the under-lying action, whether financial statement errors occur due to intentional actions or unintentional actions. Deliberate actions are more difficult to detect and control than unintentional actions [2].

Industry 4.0 uses huge amounts of big data, this makes auditors faced with clients who involve big data in business processes and preparation of financial reports. So it is natural to talk about the application of data analytics for auditors is about improving audit quality. There are different points of view on what this means in practice but audit quality is a common goal of auditors, regulators and standard setters. High-quality, focused and effective audits are aligned with the way the audited entity manages its data and operations. Data analytics offers a practical way for auditors to manage several important aspects of Information Technology systems in larger audits. Competitive tenders for audits of listed companies have sharpened the focus on data analysis techniques, and audit committees now routinely ask prospective auditors how they would use them in audits [3].

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## 2. Literature Review and Hypothesis

### 2.1. Effect of Big Data Analytics on Forensic Audit

According to [4] big data can also increase the adequacy, reliability and relevance of audit evidence. Of course this can directly improve the quality of audits, including forensic audits. [4] give an example, for example an auditor will verify information on a shipment. Through big data, forensic auditors can use and maximize data from GPS to obtain more valid information in order to verify the delivery. So it is natural that big data has a big role to maximize the role of forensic audit. Based on the various explanations above, the following hypothesis can then be formulated:

H1: Big data analytics has a positive effect on forensic audit

### 2.2. Effect of Big Data Analytics on Fraud Detection

Big data can expand the source and size of information needed by auditors in order to detect fraud. This will then support the analytical process, which will have an impact on improving the quality of audit results in fraud detection. This is in line with agency theory, where big data can be a solution to overcome the agency problem (in the form of fraud) that often occurs in various types of agencies, especially in government institutions. So it can be seen that big data is indeed capable of being an efficient and effective tool for fraud detection. Research conducted by [4] has proven that big data is indeed effective and efficient for detecting fraud. Based on various previous explanations, the following hypothesis is formulated:

H2: Big data analytics has a positive effect on fraud detection

### 2.3. Effect of Forensic Audit on Fraud Detection

Forensic audit is believed to be an effective method to detect and reveal fraud. In fact, forensic audits can also increase the effectiveness of using technology in the form of big data in order to detect fraud [5]. The combination of the use of big data and forensic audits will be an effective solution to resolve agency problems in the form of fraud that is rampant to this day.

[6] stated that forensic audits in the process of detecting fraud will utilize and combine various types of disciplines such as criminology, law and litigation, public sector administration, investigation, information and communication technology. This is because, this audit requires the auditor not only to seek and collect audit evidence, but must collect legally valid evidence, with very complex criteria. Based on the explanation above, the following hypothesis is formulated:

H3: Forensic audit has a positive effect on fraud detection

H4: Forensic audit strengthen effect of big data analytics on fraud detection

## 3. Research Methodology

This research is a quantitative research. This study uses statistical tests to test the hypothesis statement. The data used in statistical data processing in this study is primary data. Primary data is data obtained by the researcher himself. Primary data in this study were collected by distributing questionnaires to respondents. The questionnaire in this study was prepared using a Likert scale using numbers from one to five, starting from strongly disagree to strongly agree. We distributed questionnaires to research respondents, namely auditors who work in public accounting firms in the Greater Jakarta Area.

The population in this study are auditors who work in public accountants in the Greater Area of Jakarta, where the total population is not known with certainty. This is due to the high level of employee turnover in public accounting firms. Every time there are auditors who enter and leave, both from one accounting firm to another, or to companies or industries, and vice versa. So for the sampling method, we used [7] sampling approach for the unknown population. [7] said that the number of valid samples is between 30-50 samples. Thus we use a sample of 137 respondents, which is more than standard.

## 4. Research Result and Discussion

### 4.1. Identity of Respondents

The number of questionnaires that have been filled out and are suitable for analysis in this study are 137 questionnaires, with details:

Table 1: Identity of respondents

| Age | | Gender | | Position | | Work Experience | |
|---|---|---|---|---|---|---|---|
| 20-30 years | 36 | Male | 76 | Junior Auditor | 47 | 1-5 years | 47 |
| 31-40 years | 79 | Female | 61 | Senior Auditor | 65 | 6-10 years | 51 |
| 41-50 years | 16 | Audit firm size | | Audit Manager | 17 | 11-15 years | 28 |
| 51-60 years | 6 | Big Four | 70 | Audit Partner | 8 | > 15 years | 11 |
| | | Non Big Four | 67 | | | | |

Source data processed

Based on table 1, we can conclude that the majority of our respondents is male, ages between 31 – 40 years, positioned as senior auditor, and has experience between 6-10 years, between big four and non-big four almost equal.

## 4.2. Validity and Reliability Test

Validity is defined as the ability of indicators to generate deep values repeatedly (consistently) in each research activity. Measurements used to test the reliability is Average Variance Extracted (AVE). The AVE value aims to measure the level of variance of a construct components compiled from the indicators by adjusting for the error rate. Tests with an AVE value are more critical than composite reliability. Minimum recommended AVE value is 0.50 [8]. Based on information presented in table 2, we can conclude that our research variables has passed convergent validity test, because all AVE value has exceed 0.5

Furthermore, the reliability test is also carried out constructs measured by the composite criteria reliability of the indicator block that measures construct. The construct is said to be reliable if the value of composite reliability and Cronbach's Alpha above 0.7 [8]. Based on table 2, we can conclude that all variables in this model has passed the re-liability test, because all Cronbach's Alpha and Composite Reliability all has exceed 0.7.

Table 2: AVE, Cronbach's Alpha, Composite Reliability

| Variable | AVE | Cronbach's Alpha | Composite Reliability |
|---|---|---|---|
| Big data Analytics | 0.688 | 0.847 | 0.898 |
| Forensic Audit | 0.596 | 0.831 | 0.880 |
| Fraud Detection | 0.603 | 0.887 | 0.913 |

Source data processed

## 4.3. Hypothesis Testing

In order to conclude whether the hypothesis is accepted or rejected, use the p-value on significance = 5% or 0.05. If p-value < 0.05 then hypothesis is accepted, meaning that there is a significant effect. On the other hand, if p-value > 0.05 then hypothesis is rejected means no significant effect. The following is the result of the model evaluation structural hypothesis test that has been carried out with using the PLS method obtained from the bootstrapping report of Smart PLS 3.0 which is presented on Table 3.

Table 3: Hypothesis testing

| Variable | T | P-Value |
|---|---|---|
| H1: Big Data Analytics →Forensic Audit | 14.928 | 0.000 |
| H2: Big Data Analytics →Fraud Detection | 2.931 | 0.005 |
| H3: Forensic Audit → Fraud Detection | 2.363 | 0.035 |
| H4: Big Data Analytics → Forensic Audit → Fraud Detection | 3.363 | 0.000 |

Source data processed

Based on table 3, on first hypothesis we can conclude that big data analytics has a significant effect on forensic audit, it can refer to p-value sig 0.000 that is lower than 0.05 and t statistic 14.928 is higher than t table 1.95. This found is in line with previous study by [3] and [9]. On second hypothesis, we can conclude

that big data analytics has a significant effect on fraud detection, it can refer to p-value sig 0.004 that is lower than 0.05 and t statistic 2.931 is higher than t table 1.95. This result supports previous studies by [4] and [10]. On Third hypothesis, we can conclude that forensic audit has significant effect on fraud detection, it can refer to p-value sig 0.035 that is lower than 0.05 and t statistic 2.363 is higher than t table 1.95. This result supports previous studies by [11] and [6]. Fourth hypothesis has p-value sig 0.000 which is lower than 0.05 and t statistic of 3.363 which is higher than t table 1.95, so we can conclude that forensic audit able to moderate and strengthens the effect of big data analytics to fraud detection. Figure 1 presented path coefficient of our research model.

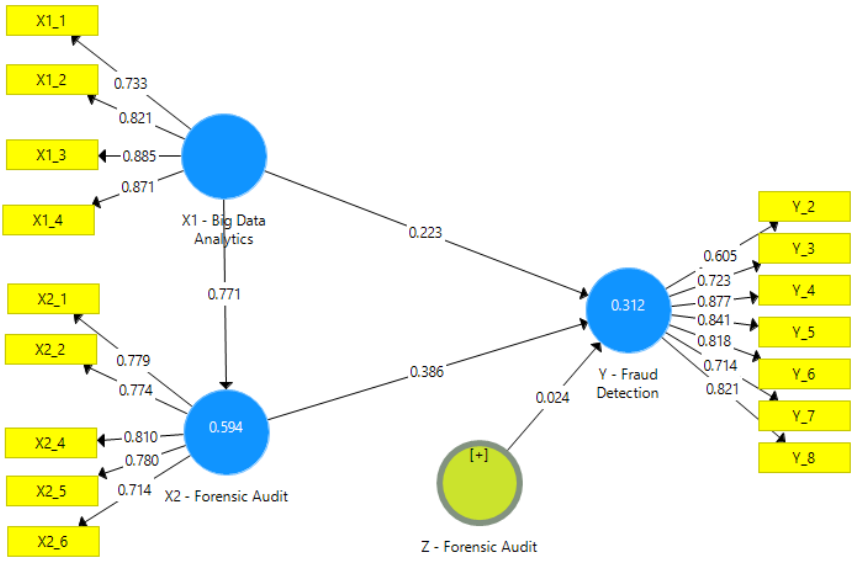


Fig. 1: Research path coefficient

## 4.4. Sobel Test

In addition to testing the moderating variable using Smart PLS, we also use another test, namely testing using the Sobel test. Using Sobel Test Calculator, we need to insert the value of coefficient and standard error from relationship between independent variable big data analytics to fraud detection and relationship between variable forensic audit to fraud detection. The result of Sobel Test is T Statistic 3.380 with 0.00003 for one-tailed probability, this result in line with Smart PLS moderating effect result, means that forensic audit strengthens the effect of big data analytics to fraud detection.

## 4.5. Discussion

Big data can be interpreted as a collection of large and diverse data that is difficult to process using the traditional approach, which has 5 main characteristics, abbreviated as 5V (Volume, Variety, Value, Veracity and Velocity). Through its capabilities, it turns out that big data has a significant role to assist auditors in carrying out their duties (including forensic auditors). Through the use of big data, it allows auditors to be able to analyse larger, diverse and faster amounts of data so that the audit process for identifying fraud will become easier [3]. This is not surprising, because big data can actually facilitate auditors to obtain a variety of additional external data (not only internal) from various sources such as data obtained from social media, website monitoring, email, online media portals and so on [12]. So that the scope of data analysed by auditors through big data becomes very complex, and of course this will have an impact on a more in-depth analysis process by auditors. It should be noted that even though large amounts of data are analysed, through the data analytical tools contained in big data, the analysis process (both structured and unstructured data) can be carried out quickly.

# 5. Conclusion and Suggestion

It can be concluded that big data has a very significant role in improving the quality of an audit, including forensic audits. This is in line with the results obtained in this study. This study also proves that big data has a positive effect on forensic audits. So the results of testing this hypothesis further increase the belief that it is true that the use of big data for forensic audits in the context of fraud detection is a solution to

the emergence of agency problems, in this case, fraud. It is hoped that the results of this research can be important information and can encourage public accounting firms and various corporate or organizational entities to always use big data technology in the fraud detection process through forensic audits, although it requires a large investment at the beginning of its implementation. However, given the magnitude of the positive impact that will be obtained in the future.

Referring to the results of this research, it is hoped that in the future public accounting firms and companies can consider utilizing big data technology and forensic auditing in order to detect fraud. The use of these technologies and methods is expected to be a solution for all parties who have been looking for methods that are indeed very effective and efficient to detect fraud. Investing in big data and preparing auditors to conduct forensic audits in collaboration with big data (through education and training) will be the right first step for those who are committed to reducing the number of fraud cases that occur.

The limitations of this study were that during the COVID-19 pandemic, this had an impact on the process of distributing and collecting the results of filling out this research questionnaire which was a bit time-consuming (impeded). As for future suggestions for other authors who are interested in conducting similar research, it would be better to add some potential variables that can strengthen the relationship between forensic audits and the fraud detection process. The use of variables such as experience may be used as a consideration for further research

## 6. Acknowledgements

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