

## The Impact of Big Data Analytics on Audit Quality in the Digital Era

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### ABSTRACT

This study aims to examine the impact of Big Data Analytics on Audit Quality using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach. The research involved 120 respondents consisting of auditors from Big Ten public accounting firms in Indonesia. The Big Data Analytics variable was measured based on five main dimensions: volume, velocity, variety, veracity, and value. The results indicate that Big Data Analytics has a positive and significant effect on Audit Quality. This relationship is demonstrated by a path coefficient in the moderate category, with a significance level below the five percent threshold. The coefficient of determination shows that nearly half of the variation in Audit Quality can be explained by Big Data Analytics. These findings confirm that effective implementation of Big Data Analytics can enhance the effectiveness, efficiency, and reliability of the audit process. The study also supports the application of the Technology Acceptance Model framework, where perceived usefulness and ease of use of technology contribute to improved audit quality. The practical implications of this research highlight the importance of data-driven strategies in enhancing audit quality in today's digital era.

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## INTRODUCTION

The rapid development of information technology has brought significant changes to various aspects of the audit profession, particularly in improving audit quality through the utilization of big data. In the digital era, auditors face challenges such as massive data volumes, transaction complexity, and an ever-increasing speed of information. These factors drive the need for more adaptive, sophisticated, and data-driven audit methods. Big data refers to large volumes of diverse and high-velocity data that cannot be processed using conventional audit tools or methods. According to Ian Mitchell et al. (2012), big data includes various information sources such as social media data, location data, and other digital data, which, when properly analyzed, can provide high business value and information reliability. The audit profession is highly relevant in this context, as auditors are now expected to efficiently process large data volumes to detect risks, anomalies, or hidden fraud in financial statements.

Salijeni et al. (2021) emphasize that integrating big data analytics into modern audits can significantly improve audit quality. Big data allows auditors to identify risks earlier, enhance the efficiency of evidence collection, and strengthen the reliability of audit outcomes. Huy and Hung (2022) also argue that in an increasingly complex audit environment, auditors' ability to manage and analyze big data is key to successful audit processes. Furthermore, Kend & Nguyen (2020) found that the use of big data substantially enhances audit quality, especially in large firms such as the Big Four. This is due to big data's ability to help auditors identify unusual transaction patterns, improve the accuracy of



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material error detection, and expand the audit scope from partial data (sampling) to the entire data population (full data audit). This aligns with Dagiliene and Kloviene (2019), who highlight the importance of mastering big data technology in auditing processes so that auditors can handle large volumes of information and identify anomalies that are difficult to detect using traditional techniques.

Meli and Hu (2022) also state that digital transformation has introduced new risks in the audit profession, including those related to the use of big data. As a result, auditors are required to develop new competencies in data-driven risk management and adapt their audit methods and tools. However, the use of big data in audits also faces challenges. Deloitte (2024) notes that integrating data from various platforms is often difficult due to differences in format, volume, and speed. KPMG (2024) also highlights compliance issues with personal data protection regulations, which may affect the legitimacy of data use in audit processes. Therefore, beyond technical competencies, auditors are also expected to have a deep understanding of ethics and regulations governing big data processing. Serag & Al Aqiliy (2020) apply the Technology–Organization–Environment (TOE) framework to explain contextual factors in the adoption of Big Data Analytics (BDA). This framework shows that technological conditions, organizational factors, and the external environment influence the effectiveness of BDA in audit quality—including audit input, process, and output.

With the increasing importance of big data in audit processes, audit quality is no longer solely determined by traditional auditor expertise but also by their ability to optimally leverage technology and data analytics. Big data-based audits have the potential to strengthen the independence, accuracy, and transparency of the audit process as a whole. Abdelwahed et al. (2024) developed a SEM model showing that BDA has a direct impact on audit processes and auditor competence, as well as an indirect and significant effect on overall audit quality.

Based on this background, this study focuses on the impact of big data implementation on audit quality, with the research object being large-scale public accounting firms in Indonesia (Big Ten), in response to the need for improved audit quality amidst increasingly complex data. In an increasingly complex and dynamic business environment, companies generate and collect data from various sources at incredible speeds. This data—characterized by high volume, velocity, and variety—is collectively referred to as Big Data (Laney, 2001). This phenomenon, known as the 3Vs by Gartner, is a critical success factor for many organizations (Manyika et al., 2011).

For auditors, Big Data offers great potential to enhance audit efficiency and effectiveness. Traditionally, audits have relied on sampling, which carries inherent risks related to the completeness and accuracy of information (Appelbaum et al., 2017). With Big Data, auditors have the potential to analyze the entire population of transactions rather than just a sample, thus providing a higher level of assurance regarding financial reports and internal operations. However, integrating Big Data into the audit process is not without challenges, including the need for new technologies, relevant expertise, and changes in audit approaches (Vasconcelos et al., 2020; Al-Maqoushi et al., 2023).

Big data in the audit context encompasses various types of data—both structured and unstructured—that are relevant to the audited entity (Alles et al., 2018). Examples include: Transactional Data: Complete records of sales, purchases, payroll, and other financial transactions from ERP systems. Operational Data: Data from CRM systems, server logs, IoT sensors, and other operational data that provide insight into business performance. External Data: Market data, social media, news, economic data, and other external information that can influence risk assessments and audit decisions (Brown-Liburd et al., 2015). The use of Big Data enables auditors to: Identify Anomalies: Detect unusual patterns or transactions that may indicate fraud, errors, or inefficiencies (Cao et al., 2015; Mahyuni et al., 2021). Perform More Accurate Risk Analysis: Conduct deeper and more comprehensive risk assessments by considering more variables and data interconnections

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### **The Impact of Big Data Analytics on Audit Quality in the Digital Era**

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(EY, 2016; Rounaq et al., 2023). Implement Continuous Auditing: Apply real-time or near real-time monitoring to detect issues as they arise (Vasarhelyi et al., 2015; Zhang et al., 2022). Full Population Testing: Test the entire population of transactions rather than relying solely on samples, significantly increasing audit coverage.

The Impact of Big Data on Audit Quality Audit quality can be defined as the level of assurance provided by the auditor that financial statements are free from material misstatements (DeAngelo, 1981). The integration of Big Data has significant potential to improve audit quality through various aspects: Improved Audit Coverage and Depth: With the ability to analyze entire data populations, auditors can identify issues that may be missed using sample-based approaches. This leads to broader audit coverage and deeper understanding of entity operations (Brown-Liburd et al., 2015; Sun et al., 2020). More Effective Fraud Detection: Big Data enables the identification of complex and unusual transaction patterns that are often indicators of fraud. Data analytics algorithms can automatically flag suspicious activity for further investigation (Ngai et al., 2011; Susanti & Kurniawan, 2022). Superior Risk Assessment: With access to more data and the ability to perform advanced analyses, auditors can develop more accurate and adaptive risk assessment models, enabling more efficient allocation of audit resources to high-risk areas (EY, 2016; Rounaq et al., 2023). Better Audit Insights: Big Data analytics is not only about detecting errors, but also about providing strategic insights to management. Auditors can identify trends, operational inefficiencies, and improvement opportunities that were previously unnoticed (Appelbaum et al., 2017; Sun et al., 2020). Audit Efficiency: While initial investments in technology and training may be high, in the long term, Big Data has the potential to automate routine tasks, reduce audit time, and enhance overall efficiency (Deloitte, 2015; Al-Maqoushi et al., 2023).

Despite its promising potential, there are several significant challenges in integrating Big Data into the audit process: Auditor Skills and Competence: Auditors need new skills in data science, statistics, programming, and Big Data analysis tools. The lack of such expertise can be a major barrier (KPMG, 2015; Al-Maqoushi et al., 2023; Susanti & Kurniawan, 2022). Technological Infrastructure: Investment in adequate hardware, software, and Big Data platforms is required. This includes data storage solutions (e.g., data lakes, data warehouses), ETL (Extract, Transform, Load) tools, and data visualization software (Vasarhelyi et al., 2015; Zhang et al., 2022). Data Quality and Integrity: Big Data is often unstructured, incomplete, or inconsistent. Ensuring the quality and integrity of data used for auditing is crucial (Cao et al., 2015; Mahyuni et al., 2021). Data Privacy and Security: Handling large volumes of data, especially sensitive data, raises concerns about data privacy and cybersecurity. Auditors must comply with relevant privacy regulations (e.g., GDPR, Indonesia's Personal Data Protection Law) (Alles et al., 2018; Susanti & Kurniawan, 2022). Changes to Audit Methodology: Traditional audit methodologies may need to be adjusted to accommodate Big Data analysis, including changes in planning, execution, and reporting (Deloitte, 2015; Sun et al., 2020). Implementation Costs: Acquiring technology and training human resources for Big Data requires significant financial investment (KPMG, 2015; Rounaq et al., 2023).

## METHODS

According to Sekaran and Bougie (2020:103), research methods are systematic and organized approaches used by researchers to identify, formulate, and analyze research problems, with the aim of finding solutions or drawing conclusions based on facts that can be scientifically tested. The research method used in this study refers to the approach emphasized by Sekaran and Bougie (2020), which highlights the importance of data validity and reliability, as well as the use of appropriate statistical analysis techniques, particularly in quantitative research. They also stress the importance of selecting the correct research design, whether exploratory, descriptive, or causal.

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Respondents in this study were selected using purposive sampling, a non-probability sampling technique that selects individuals based on specific criteria relevant to the objectives of the research. These criteria include at least two years of work experience in the field of auditing and direct involvement or understanding of Big Data in the audit context (Hair et al., 2021).

This study adopts the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach. SEM-PLS is a multivariate statistical technique used to test structural relationships between latent variables. This method is suitable for relatively small sample sizes, complex models, and non-normally distributed data (Hair et al., 2021).

The data analysis stage includes the evaluation of the Inner Model (Structural Model), which is used to test hypotheses between latent variables. The analysis includes: Path Coefficient: direction and strength of the relationship. t-statistic and p-value: statistical significance. R-square ( $R^2$ ): the extent to which independent variables explain the dependent variable. Q-square ( $Q^2$ ): predictive relevance. f-square ( $f^2$ ): effect size of each path

## RESULTS AND DISCUSSION

### Respondent Profile Based on Gender

The table shows the profile of auditor respondents from Big Ten accounting firms based on gender.

**Table 1. Respondent Profile Based on Gender**

No.	Gender	Frequency	Percentage
1	Male	56	54.9%
2	Female	46	45.1%
Total		102	

Source: Appendix of Smart PLS Output (2025)

The data obtained from the questionnaires completed by respondents indicate that there were 56 male respondents (54.9%) and 46 female respondents (45.1%).

### Instrument Reliability Test Results

**Table 2. Reliability Test Results**

Variable	Number of Items	Reliability Coefficient (Cronbach's Alpha)	Critical Value	Conclusion	Variable
Big Data Analysis (X2)	9	0.920	0.7	Reliable	Big Data Analysis (X2)

Source: Appendix of Smart PLS Output (2025)

From the table above, it can be seen that the reliability values obtained for each variable are greater than the critical value of 0.7. The calculated Cronbach's Alpha reliability score for each variable indicates a dependable value, meaning that the measurement instrument provides consistent results.

### Descriptive Analysis of Big Data Analysis

The respondents' assessment of Big Data Analysis as a whole is summarized in the following table.

**Table 3. Reliability Test Results**

Indicator	1	2	3	4	5	Total Score	Ideal Score	%	Average Score	Category	Remarks
<b>Volume</b>											
File Size	0	7	13	36	46	427	510	83.7%	4.19	High	Infrastructure is fairly capable of handling large data volumes
Data Growth Rate	0	4	10	41	47	437	510	85.7%	4.28	Very High	High data growth, adaptive system
<b>Velocity</b>											
Data Ingestion Rate	1	6	9	44	42	426	510	83.5%	4.18	High	Data ingestion speed is quite optimal
Data Processing Speed	1	4	10	44	43	430	510	84.3%	4.22	Very High	Processing time is fast and efficient
<b>Variety</b>											
Data Types (Structured, Semi-Structured, Unstructured)	2	3	11	34	52	437	510	85.7%	4.28	Very High	System supports various data formats
Data Complexity (Measures diversity in data structure)	0	6	12	50	34	418	510	82.0%	4.10	High	Good capability in handling complex data
<b>Veracity</b>											
Data Quality	3	3	19	31	46	420	510	82.4%	4.12	High	Data quality is generally good, requires ongoing quality control
Data Source Reliability (Assesses source credibility)	0	6	16	36	44	424	510	83.1%	4.16	High	Data sources are fairly trustworthy
<b>Value</b>											
Data Accuracy and Quality	0	3	15	38	46	433	510	84.9%	4.25	Very High	Data is high-value and used effectively
<b>Total Big Data Analysis Score</b>						<b>3852</b>	<b>4590</b>	<b>83.92%</b>	<b>4.20</b>	<b>High</b>	

Source: Appendix of SmartPLS Output (2025)

The assessment score for Big Data Analytics based on the total score is 3852, with an average of 4.20 (83.92%). Overall, the evaluation of Big Data Analytics falls into the high category. This score indicates that the implementation of big data analytics in your organization is already well-executed. The average score is close to "Very High", suggesting that the key aspects of big data (the 5Vs: Volume, Velocity, Variety, Veracity, and Value) have been effectively applied.

Respondents' assessments of Audit Quality overall are summarized in the following table.



## Distribution of Respondents' Responses on Audit Quality"

**Table 4. Respondents' Responses on Audit Quality**

Indicator	1	2	3	4	5	Total Score	Ideal Score	%	Average Score	Category	Remarks
<b>Auditor Competence</b>											
Auditor Competence	0	11	40	4	47	393	510	77.1%	3.85	High	Requires enhancement in training and skill development for auditors
<b>Auditor Independence</b>											
Auditor Independence	2	28	23	3	46	369	510	72.4%	3.62	High	Needs special attention, as it's close to the Moderate category
<b>Compliance with Standards and Professional Guidelines</b>											
Proper Implementation of Audit Procedures	1	0	25	39	37	417	510	81.8%	4.09	High	Auditors comply with procedures, can be improved with better supervision
Compliance with Audit Standards and Professional Ethics	1	0	25	33	43	423	510	82.9%	4.15	High	Indicates maintained integrity and professionalism
<b>Auditor Ethics and Integrity</b>											
Effective Communication and Transparency	1	1	23	49	28	408	510	80.0%	4.00	High	Audit communication is good, but improvement needed for full transparency
<b>Total Audit Quality Score</b>						<b>2010</b>	<b>2550</b>	<b>78.8%</b>	<b>3.94</b>	<b>High</b>	

Source: Appendix of SmartPLS Output (2025)

The assessment score for Audit Quality based on the total score is 2010, with an average of 3.94 (78.8%). Overall, the evaluation of Audit Quality falls into the high category. In general, audit quality is rated as good (high category), but it has not yet reached the very high category. Some aspects indicate the need for improvement, particularly in auditor competence and independence.

### Structural Model Validity (Inner Model)

This measures the relationships between latent variables and the strength of their influence. Path Coefficient (with T-value and P-value)

**Table 5. Inner Model**

Relationship	Coefficient	T-Statistic	P Value	Description
X → Y (Big Data Analytics → Audit Quality)	0.325	2.870	0.004	Significant"

Source: Appendix of SmartPLS Output (2025)

The relationships between variables are statistically significant ( $p < 0.05$ ). 3. R-Square ( $R^2$ ) Value. Measures how much the independent variable explains the dependent variable. Big Data Analytics → Audit Quality: Coefficient: 0.325 → indicates a moderate positive influence  $T = 2.870$  and  $p = 0.004$  → significant The effective use of big data has a positive impact on audit quality

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## The Extent of Big Data Analytics' Influence on Audit Quality

Table 6. Value R-square

Relationship	$\lambda$	T-Statistic	R square
Big Data Analytics (X) → Audit Quality (Y)	0,699	7,468	0,49,5

Significant at the 0.05 level, t-table = 1.96

Source: Appendix of SmartPLS Output (2025)

The R-square value for the dependent construct Big Data Analytics on audit quality is 0.489. This result indicates that Big Data Analytics explains 48.9% of the variance in audit quality. Based on the R-square value above, it can be concluded that Big Data Analytics has a strong influence on Audit Quality.

Table 7. Big Data Analytics' Influence on Audit Quality

Variable	Path Coefficient (R)	Direct Effect (R <sup>2</sup> )	Indirect Effect (via)		Total
			X2	X3	
	$\rho_{yx1}$	$(\rho_{yx1})^2$	$\rho_{yx1} \cdot r_{x1x2} \cdot \rho_{yx2}$	$\rho_{yx1} \cdot r_{x1x3} \cdot \rho_{yx3}$	
X <sub>1</sub>	0,398	0,398 x 0,398 0,158	0,398 x 0,236 x 0,356 0,033	0,398 x 0,144 x 0,199 0,011	0,367

Source: Appendix of SmartPLS Output (2025)

The calculation result shows that the influence of Big Data Analytics on Audit Quality is 0.367. This value was obtained through calculations using the path coefficient of the Big Data Analytics variable as well as latent variable correlations. Directly, Big Data Analytics contributes 36.7% to audit quality.

Table 7. Significance Test of the Influence of Big Data Analytics on Audit Quality

Path Coefficient	t-value	Critical t-value	Conclusion
0,220	2,170	1,96	The hypothesis is accepted

Source: Appendix of SmartPLS Output (2025)

The t-value of the path coefficient for the variable Big Data Analytics on Audit Quality. information system quality is 2.170, which is greater than the critical t-value of 1.96. Therefore, it is concluded that Big Data Analytics has a significant influence on Audit Quality.

Hypothesis testing of the influence of Big Data on audit quality was conducted using the t-test statistic. This statistical test follows the rule: reject  $H_0$  if the t-value is greater than the t-table value; otherwise, accept  $H_0$  if the t-value is less than or equal to the t-table value.

The calculation results show that the relationship between organizational big data analytics and audit quality is indicated by a path coefficient value of 0.325, with a t-value of 2.870 and a p-value of 0.004. The t-statistic value (2.870) is greater than the critical t-value (1.96), and the p-value (0.004) is less than the alpha level of 0.05. This result indicates that the test is statistically significant. Therefore, it can be concluded that there is a direct and positive influence of organizational big data analytics on audit quality. The magnitude of the direct influence of big data analytics on audit quality is  $(0.329 \times 0.329 \times 100\%) = 10.8\%$ . This means that big data analytics contributes 10.8% to audit quality.

This finding aligns with the theory and research results presented by Al-Ateeq et al. (2022), who used the Technology Acceptance Model (TAM) to study the adoption of Big Data Analytics in auditing. The study found that perceived usefulness and ease of use have

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a direct effect on audit quality, with the use of Big Data Analytics moderating the relationship between perceived usefulness and audit quality. Similarly, Al Lawati and Hussainey (2024) analyzed the impact of Big Data disclosure on audit quality in financial firms. Their study concluded that disclosing Big Data information significantly improves audit quality.

Nasta et al. (2024) explored the impact of implementing Big Data Analytics in external audits on audit effectiveness, efficiency, and risk. Their study revealed that the use of Big Data Analytics enhances audit efficiency and effectiveness. Ditkaew and Suttipun (2023) examined the impact of big data using Audit Data Analytics (ADA) on audit quality and audit review continuity. The study found a positive effect on both audit quality and review continuity. Abdelwahed et al. (2024) assessed the impact of adopting Big Data and Data Analytics (BD&A) on audit quality. The results indicated that BD&A has a significant positive impact on the audit process and auditor competence.

Furthermore, this is in line with the theory proposed by Al Ateeq (2022), which adopts the Technology Acceptance Model (TAM). This theory identifies two main variables driving technology adoption: perceived usefulness and perceived ease of use. The study showed that these two variables directly improve audit quality, even without the actual use of big data analytics. The application of big data analytics in audit practice provides several significant benefits, including increased audit efficiency, minimized potential errors, and enhanced transparency throughout the audit process. In addition, big data plays an essential role in building and strengthening stakeholder trust in the audit results presented. Hezam et al., (2023) also supports these findings.

## CONCLUSION

The results of the study indicate that Big Data Analytics has a positive and significant influence on audit quality in the Big Ten public accounting firms (KAP) in Indonesia. The implementation of Big Data Analytics enhances the effectiveness, efficiency, and reliability of the audit process. These findings support the theory that perceptions of usefulness and ease of use of technology contribute to improving audit quality. Therefore, data-driven audit strategies are an important step in addressing the challenges of auditing in the digital era

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