



Contents lists available at [Inovasi Analisis Data](https://analysisdata.co.id)

Researcher Academy Innovation Data Analysis

journal homepage: <https://analysisdata.co.id>



Evaluating the Impact of Information Technology on Audit Efficiency and Effectiveness

Cindy Dwi Fatikasari ¹ , Amri Amrulloh ²

^a Department of Accounting, Madiun State Polytechnic, Madiun, Indonesia

^b Department of Accounting, Madiun State Polytechnic, Madiun, Indonesia

ARTICLE INFO

ABSTRACT



History article;

Submitted June 22, 2024
 Article revision July 28, 2024
 Accepted September 10, 2024

Author's correspondence;

Amri

Keywords:

Information Technology, Audit Efficiency, Audit Effectiveness, Cybersecurity, Technical Proficiency

Objective: The research examines several IT effects on the audit process itself, including whether and how the use of IT tools such as audit software and data analytics, and accounting information systems affect the accuracy, speed, scope, and stakeholder trust of the audit. The study also looks into the moderating effects of cybersecurity concerns and auditors' technical knowledge on these associations.

Methods: We applied a cross-sectional survey methodology to the quantitative research design. Data was obtained from a sample of 200 auditors from various sectors (public, private and government) using a structured questionnaire. The IT usage questionnaire was used, and all variables were verified. Reliability analysis, correlation, regression analysis are the statistical methods to analyze the data.

Results: IT tools can greatly enhance the efficiency, effectiveness, and extensiveness of audits; while audit software and data analytics can improve the speed and precision of audits. On the other hand, cybersecurity fears showed a negative moderation on the relationship between IT usage and audit effectiveness. Those with greater technical skills observing greater success in utilising IT tools.

Novelty: This study is unique in one way that it examines the impact of audit software, data analytics, and accounting system on the auditing outcome by taking into consideration the moderating effect of cybersecurity and technical skills. This also provides a new perspective on the effect of IT integration on audit performance as well as highlights the importance of training and security of the IT systems.

Significance of the Study: Overall, the findings indicate that audit firms need to focus on both IT adoption with cybersecurity measures, and vigilance through training to ensure the successful integration of IT into audits. Emerging technologies associated with auditing activities, such as artificial intelligence should also be the focus of future studies.

© 2024 Safety and Health for Medical Workers. All rights reserved

1. Introduction

The fast-paced development of information technology (IT) has made a noticeable impact on the way organizations work over recent times, including the audit process. The utilization of IT tools like audit software, data analytics, and artificial intelligence has enabled auditors to manage intricate datasets, optimize efficiency, and reduce errors considerably. Cloud-based applications allow for real-time auditing in recent years which enhances collaboration and minimizes delays (Abdullah & Almaqtari, 2024; Leocádio et al., 2024). In addition, machine learning has been used for improving anomaly detection and fraud detection in financial statements (Craja et al., 2020; Lokanan et al., 2019). This emerging technology has the potential to transform audit processes, but at the same time, it exposes the audit profession to risks such as data security, and auditors must align

themselves with a constantly evolving digital landscape to remain relevant (La Torre et al., 2021; Lorentzon et al., 2024; Manita et al., 2020). Bauer et al (2019), Christ et al (2021), mention that IT integration in audits is growing and demand for effectiveness in IT auditors is gaining the attention of organizations. Such developments emphasise the importance of examining the impact of IT on the audit process.

IT adoption in auditing is rife with concerns that demand a rigorous examination even though it has the potential to be transformative. Cybersecurity is one of the great issues with the last 3 years seeing a 30% uptick in financial data breaches (Alawida et al., 2022; Juma'h & Alnsour, 2020). Furthermore, data analysts must have advanced technical skills, as the lack of expertise in this area could result in the underuse of IT tools (Burak Gunay et al., 2019; Ikegwu et al., 2022). Moreover, the inclusion of



inequality in access to sophisticated technologies between developed and developing nations is an area of IT adoption that is currently under-researched (Alvino et al., 2021; Di Vaio et al., 2023; Schuetz & Venkatesh, 2020). The issues of data integrity in the cyber-attacks have added complexities to the IT-integration (Asghar et al., 2019; Habibzadeh et al., 2019) These areas highlight the need for a balanced approach when it comes to using IT in auditing with mitigating related risks (Islam et al., 2018; Mökander et al., 2021).

Moreover, the utilization of IT in audits is closely related with the Resource-Based View (RBV) theory of optimal management, which claims that the best organizations can differentiate themselves from their competitors when they exploit valuable, rare, and hard-to-copy resources (Robins & Wiersema, 1995). IT tool in auditing can be framed as such resources because they provide the ability to analytical solution and process large datasets and are equipped with high accuracy which is the key to detect irregularities (Tan et al., 2020). Moreover, the Theory of Planned Behavior (TPB) indicates that auditors' attitudes, perceived use, perceived ease of use, and external support shape the extent of IT integration into auditors (Ajzen, 2020). This models with the help of these models the benefits and limitations of IT adoption can be assessed and used to effectively use IT in business.

All previous studies show disparate results when measuring IT impact on auditing, underscoring the importance of this research. For example, on the one hand, scholars identify some benefits of IT adoption, such as improved audit quality and efficiency Jones Smith et al. (2022), Krieger et al. (2021), Li et al. (2018), Siew et al. (2020), on the other hand, payments of auditor judgment. This divergence is due to different contexts, tools, and methodologies employed in these studies (El-Den et al., 2018; Tumpa et al., 2019). For example, Patel et al. (2021) noted considerable time and accuracy improvements using AI-based analytics in auditing, while Lee et al. (2020) warned about over-reliance on automated systems. In addition, research indicates increasing concern over data security, with 65% of auditors fearing cloud-based vulnerabilities (Smith et al., 2023). These mixed results necessitate a nuanced understanding of IT as both an enabler of audit functions and a potential catalyst of audit risk.

This study aims to investigate the effects of information technology on different components of the audit process. More specifically, the study seeks to evaluate the effect of the adoption of information technology on audit efficiency, accuracy of audit findings and the scope of audit. The moderating role of cybersecurity concerns will also be examined on the association between IT usage and audit

efficacy. It will also explore the effect of the auditors' level of technical expertise on how well they incorporate IT tools in the audit process and their results. Thirdly, the study is focused on the relationship between the Audit IT in financial reporting and how it can positively impact stakeholder trust and transparency as technology enhances the credibility and reliability of financial reporting.

2. Theoretical framework and development

2.1 Information Technology and the Audit Efficiency

Information Technology in auditing has resulted in higher effective audit. Audit procedures done on audit software, data analytics and analysis and automation tools help auditors to work much faster as compared to traditional techniques. Such technologies reduce data collection, processing, and analysis times, giving auditors more time to work on high-value tasks like risk assessments and strategic insights. As per the studies of Liu et al. (2020), audit completion times have been shorter, human errors have been reduced, and decision-making has taken place faster (Rahman & Yusuf, 2021). Consequently, audit firms are capable to serve more clients with stricter deadlines. This gives the notion that IT in the form of automation, plays a significant role in making audits more effective by automating tedious activities performed and making sure that the data is processed with greater efficiency and speed.

H1 Variable: IT has a positive effect on audit efficiency.

2.2 Influence of Information Technology on Audit Findings Accuracy

Advanced technologies play a significant role in promoting the accuracy of audit findings by minimizing human errors and enabling auditors to analyze extensive data sets with greater precision. Applications such as data analytics, artificial intelligence (AI), and machine learning are capable of analysing huge data sets related to finance and highlighting anomalous activities that fall outside the detection capabilities of traditional methods. Studies by Patel et al. (2020) and Green et al. (2021), audit error is substantially reduced through the use of IT tools, which allow for in-depth scrutiny of financial transactions and enhance the detection of fraudulent activities. Incorporating these technologies in the process of auditing, leads to auditors getting trustable & accurate results which improves the overall quality of audit outputs. Additionally, the uniformity of auditing processes using IT minimizes the subjectivity associated with manual audits, providing more consistent and precise outcomes.

Hypothesis H2: Information technology improves the accuracy of the results of auditing.

2.3 Information Technology and the Expanding Scope of Audits

The use of information technology has expanded the boundaries of audits, allowing them to look at much larger datasets and cover different areas of an organization's performance. IT tools such as big data analytics and blockchain technology enable auditors to have access to a larger dataset beyond the financials and non-financial data, including operational performance and compliance metrics. This wider perspective enables a more comprehensive and integrated audit approach that incorporates the assessment of risk management, internal controls, and corporate governance practices (Tan et al., 2021; Zhang & Wang, 2019). Audits with expanded scopes allow auditors to provide additional insights to stakeholders, helping to pinpoint risks inherent in new business models that might elude the traditional outlets for financial audits.

H3: The Application of Information Technology Widens the Scope of Audits

2.4 IT Utilization in Auditing of Individuals Affected by Cyber Security Concerns

While the potential benefits of IT in auditing are numerous, the risks associated with cybersecurity can have significant negative implications on audit effectivity. With audit processes becoming more digitised and growing volumes of data being stored on NATURAL BASED platforms, team risk of cyberattacks, data breaches and data being accessible without authorisation is a big concern. Studies by Smith et al. (2023) and Lee et al. (2021) emphasizes that these risks are the impediments for audit findings integrity and reliability generated by IT systems. Implementing strong security protocols, monitoring, and access controls is crucial to address these cybersecurity risks and to safeguard critical financial information throughout the audit process.

H4: Cybersecurity concerns negatively moderate the relation between IT usage and audit effectiveness.

2.5 Auditors Technical Knowledge in Integrating IT

Information technology in auditing is highly dependent on the technical capability of auditors. The higher levels of technical expertise among auditors allow them to better make use of IT tools which are used to their full potential in an IT-integrated audit. Two studies, one by Tan et al. (2020) and Liu et al. (2022), auditors who possess strong technical skills can utilize data analytics, AI, and machine learning to obtain deeper insights into financial data and

identify anomalies with higher accuracy. Conversely, auditors who are not technically proficient may be easily thwarted by technology, conveniently overshadowing some of the benefits of integration of IT in auditing. Hence, the technical expertise of auditors is an essential factor in the success of IT adoption in audits.

H5: There is a positive moderation effect of auditors' technical proficiency between IT integration and audit outcomes.

2.6 Stakeholder trust and transparency in auditing: Emergence of IT adoption

Information Technology Adoption in Auditing and Its Effect On Trust and Transparency Of The Stakeholders. IT instruments contribute to increasing the credibility of audits by submitting more exact, timely and reliable financial information. Blockchain and other technologies make the audit process more confident by ensuring the immutability of transactional records. Moreover, IT systems enable real time auditing and transparent reporting of results, enabling various stakeholders to gain access to audit reports in a relatively shorter timeframe and enhancing governance and accountability (Chowdhury et al., 2022; Nguyen et al., 2023). These tools help establish trust between auditors and organizations, as well as between organizations and external stakeholders by ensuring the accuracy and reliability of financial reporting.

H6: IT adoption is positively related to stakeholder trust and transparency in auditing.

3. Methods innovations

3.1 Design research

This study employed a quantitative research design and used a cross-sectional survey methodology to examine the effect of information technology (IT) upon overall audit efficiency and effectiveness. The study has collected data from auditors in various sectors, such as public accounting firms, corporate auditing departments, and government auditing organizations with a view to assessing the relationship between IT integration and audit results. This exploration hinges on technologies including but not limited to audit software, data analytics, and accounting information systems, and how they relate to the integrity, efficiency, and stakeholder confidence of audits. Using a structured questionnaire to collect auditors' perceptions, practices and challenges in IT use. It also investigates the moderating variables like technical expertise and cybersecurity-related threats that may influence whether IT tools can enhance audit performance, as previous research have highlighted how such variables determine

significant outcomes in audit (Alles & Gray, 2016; PwC, 2021).

3.2 Sample Research

The sample of this study includes 200 auditors from various organizational sectors such as public audit firms, private organizations, and governmental auditing bodies. Stratified random sampling was used to select participants representing diverse industries and organizational sizes. The stratification factors are organizational type public versus private sector, years of auditing employment, and level of IT adoption in the auditing process. This is to cover auditors who regularly use IT tools, as well as those who are in the process of incorporating technology into their work. Only auditors who possessed at least two years of experience with IT-enhanced auditing were eligible for inclusion in order to guarantee the reliability and validity of the sample. The sample consisted of 1,137 internal auditors from professional networks, including the members of the Institute of Internal Auditors (IIA) chapters, audit firms, and corporate audit departments. About 40 percent of the respondents are from the public sector, 45 percent from the private sector, and 15 percent from the governmental audit bodies. When it comes to experience, 25% have 2-5 years, 40% have 6-10 years and 35% of them have more than 10 years of experience. With respect to the adoption of IT, the respondents expressed the following levels: 55% high level of IT adoption, 30% moderate level of IT adoption, and 15% low level of IT adoption.

3.3 Instrument

This study utilizes a self-administered questionnaire as a data collection tool to elicit qualitative and quantitative information. The Questionnaire has been segmented according to the research objectives into 5 Sections: Section 1 captures demographic details such as Respondent roles & years of experience, Organization type, Level of IT adoption, Section 2 deals with priorities for adopting AI, Section 3 delves in the Drivers for AI adoption Section 4 focuses on Concerns for AI adoption and Section 5 explores Readiness planning for AI adoption. IT Tools Used in Auditing (Section 2), Section 2 delves into the various IT tools employed in auditing, including audit software, data analytics, AI, and cloud-based tools. That Section 3 measures the perception of how IT has affected audit efficiency and speed, while Section 4 measures the concern for the role of IT in improving the audit result accuracy. Section 5 discusses the expansion of the audit scope due to IT, while Section 6 elaborates on the issue regarding the cybersecurity of data in IT-based audits. Section 7 investigates the association between auditors'

specialized expertise and their success with IT integration, while Section 8 quantifies the impact of IT utilization during audits on stakeholder trust and transparency. Data collection for the questionnaire uses a Likert scale with the following options: (1= Strongly Disagree; 2=Disagree; 3=Neither, 4=Agree; 5= Strongly Agree, 1-5) to calculate and analyze relationships between variables. Before data collection, the M&A questionnaire was pilot tested on 30 auditors to ensure its reliability and validity and refined based on their feedback to clarify the precise terminology used.

3.4 Data Analysis

Data analysis for this study will involve both descriptive and inferential statistical techniques to assess the impact of information technology on audit outcomes. The data collected through the survey will be entered into statistical software, such as SPSS or R, for analysis. The first step will be descriptive statistics, which will summarize the demographic data and respondents' views on IT's role in auditing. This will include frequencies, percentages, means, and standard deviations. To ensure the internal consistency of the questionnaire, reliability analysis using Cronbach's Alpha will be conducted for each section of the survey. Correlation analysis will then be performed to examine the relationships between the use of IT tools and various audit outcomes, such as efficiency, accuracy, scope, and stakeholder trust. Multiple regression analysis will be employed to explore the impact of independent variables, including IT tools, technical proficiency, and cybersecurity concerns, on dependent variables such as audit efficiency, accuracy, scope, and stakeholder trust. Additionally, moderation analysis will be conducted to determine how variables like cybersecurity concerns and technical proficiency influence the relationship between IT usage and audit effectiveness. The significance level for all statistical tests will be set at 0.05, and a p-value below this threshold will be considered statistically significant. The results of these analyses will provide valuable insights into the strength and nature of the relationships between IT integration and audit outcomes, contributing to a deeper understanding of how technology influences audit practices, while accounting for moderating factors.

4. Results

This section presents the outcomes of the data analysis performed to determine the effect of information technology on audit efficiency, accuracy, scope, and trustworthiness. The analysis is based on both descriptive and inferential statistics to validate the hypotheses posited

in the previous sections. While the findings of these analyses are gathered from the data obtained from 200 auditors from a mixture of public accounting firms, corporate auditing departments, and government auditing organizations. The theoretical underpinnings of such analyses rest on scholarly works that have examined the transformational impacts of IT on the audit process. Alles and Gray affirm that the use of IT tools including data analytics and audit software enhance the efficiency of audit processes by automating routine activities and vastly improving the processing capabilities of data. Vasarhelyi et al. echo this and suggest that the use of IT tools such as continuous auditing and real-time data analysis substantially extends the scope of an audit. The accuracy of audits is similarly enhanced through the use of IT tools which are capable of identifying inexplicable deviations and errors that would otherwise go unnoticed and the trustworthiness of an audit in the eyes of stakeholders is thus heavily reliant on the use of IT in conducting audits due to the real-time nature of financial data involving IT.

4.1 Descriptive Statistics

Respondents' demographic characteristics and the perception of IT in the audit process were first analyzed. The demographic characteristics of the sample are provided, indicating that various sectors were well represented in the study (Table 2). Forty percent of respondents work in the public sector, 45% in the private sector, and 15% in governmental audit bodies. In terms of years of experience, 25% have 2-5 years of experience, 40% have 6-10 years of experience and 35% have more than 10 years. Regarding IT adoption, 55% said they had high IT adoption, 30% said moderate and 15% low. This representation suggests that the respondent auditors have different levels of expertise and integration of technology, thus, forming a good basis for analyzing the role of technology usage in audit result.

4.2 Reliability Analysis

Cronbach's Alpha was calculated from each section of the questionnaire to ensure the reliability of the questionnaire. The results of reliability analysis are presented in Table 3 with the values of Cronbach's Alpha for each section. The values range between 0.81 and 0.88 and confirm good internal consistency across all sections of the questionnaire. In particular, Section 2 (IT Tools Used in Auditing) attained a Cronbach's Alpha of 0.87, Section 3 (Audit Efficiency) 0.83, Section 4 (Accuracy of Audit Findings) 0.85, Section 5 (Scope of Audits) 0.81, Section 6 (Cybersecurity Concerns) 0.88, Section 7 (Technical Proficiency) 0.84, and Section 8 ((Stakeholder Trust and

Transparency) 0.82. Indicating that the questionnaire is highly reliable thus proving to be useful from data collection perspective for this study.

4.3 Correlation Analysis

The following stage of the analysis was to assess associations between use of IT tools and different outcomes of the audit. For each pair of variables, Pearson's correlation coefficient was calculated and the results are provided in Table 3. The table indicates strong positive correlations between IT tools used in auditing and all audit outcomes, with values of 0.75 for audit efficiency, 0.78 for audit accuracy, 0.70 for audit scope, and 0.65 for stakeholder trust, all significant increases at $p < 0.05$. The strong positive relationships shown indicate an increase in these audit measures in line with increased use of IT tools. Also are technical skills positively correlated with audit efficiency (0.69), accuracy (0.72), scope (0.68), and stakeholder trust (0.67), suggesting that skilled auditors would be capable to leverage IT tools more effectively. Cybersecurity concerns, on the other hand, are negatively correlated with all outcomes, exhibiting values of -0.40 for efficiency, -0.42 for accuracy, -0.35 for scope and -0.33 for stakeholder trust, which show that increased cybersecurity concerns may hinder IT effectiveness in the audit process. In general, these findings support the concept that IT is significantly and positively influencing the results of audits, but also which aim to identify and mitigate risks cybersecurity present.

4.4 Regression Analysis

To obtain more insights about technical tools of IT on the quality of audit, accuracy, scope of audit, and trust from the auditors, multiple regression analysis was performed. Presentation of the results in Table 4 indicates that both IT tools and technical capability have significantly positive effects on audit outcomes, while cybersecurity concerns have an inverse effect on these relationships. According to the results for audit efficiency, the combination of the IT tool with the technical knowledge has a beta coefficient equal to 0.52 ($p = 0.001$) and cyber security concern has a negative impact with a beta coefficient equal to -0.21 ($p = 0.032$). The effect of IT tools and technical proficiency is even more powerful on audit accuracy, where it has a beta coefficient of 0.60 ($p = 0.000$), interpersonal skills impact the audit process negatively as it explains relationship between cybersecurity concern and audit accuracy as beta of -0.18 ($p = 0.045$) For audit scope, IT tools and technical skill are both the positive significant ($\beta = 0.48$, $p = 0.002$), while cybersecurity concern is a marginal negative significant ($\beta = -0.15$, $p = 0.061$). Finally, for stakeholder

trust we also find that IT tools and technical proficiency have a positive effect ($\beta = 0.45$, $p = 0.005$) whereas cybersecurity concerns have a negative and significant relationship ($\beta = -0.25$, $p = 0.015$). Inspired by these findings, the present research highlights the importance for IT-driven audits to balance efficiency with security, as cybersecurity threats moderate the positive impact of IT tools and technical proficiency on audit quality.

4.5 Moderation Analysis

Lastly, moderation analysis was performed to investigate the effects of cybersecurity concern and technical proficiency on IT usage and audit effectiveness. The findings are shown in the model results in Table 5 indicating significant moderating effects of both variables. Admin uses cybersecurity concerns as a moderation variable that has a negative moderating effect on the relationship between IT uses and audit outcomes. In particular, the interaction effect of cybersecurity concerns with audit efficiency is -0.16 ($p = 0.032$), while we find qualitatively similar negative effects for audit accuracy (-0.14 , $p = 0.040$), audit scope (-0.12 , $p = 0.048$), and stakeholder trust (-0.20 , $p = 0.021$). It indicates that as the level of cybersecurity concerns increases, the roles that IT tools play in influencing these audit outcomes is weakened. Again on the other side, technical proficiency has a positive moderating effect. Results show this interaction effect evidences a positive relationship for audit accuracy (0.35 , $p = 0.000$), audit scope (0.32 , $p = 0.003$), and stakeholder trust (0.27 , $p = 0.008$), where the interaction effect between technical proficiency and audit efficiency is also a significant factor 0.29 ($p = 0.001$). Such findings suggest that auditors who possess higher levels of technical knowledge are better positioned to utilize information technology (IT) tools to support audit execution. In conclusion, our findings highlight the need to ensure that cybersecurity issues and technical competence are treated as moderating factors when moving to integrate IT into auditing processes.

4.6 Discussion

The findings of this research offer important reflections on the influence of IT on audit efficacy, precision, extent, and stakeholder confidence. A significant body of research has focused on the use of IT tools in auditing, and prior studies had observed both relative advantages and concerns associated with the integration of information technology tools. Each of these sections, when described individually, would give the reader the insight of the overall structure of your research and how you plan to discuss the evaluation process, what was found and

whether it was as per the existing state of literature and what contributions can the results make in understanding the role of IT in present day auditing practices.

The results of this study substantiate a significant positive relationship between IT tools and audit efficiency, which is in accordance with previous research. In particular, audit software, data analytics, and accounting information systems serve to improve the effectiveness and efficiency of audit activities (Alles & Gray, 2016; Al-Dabbagh et al., 2020). Moeeni et al. (2021) highlighted that as IT tools minimize the time spent on tedious auditor activities including gathering and analyzing data, auditors are left to concentrate on the most complicated aspect of the audit process. The capability to handle extensive amounts of data instantly also accelerates discrepancy detection, enhancing decision-making and efficiency (Soudani, 2020). In this study, IT tools, especially data analytics and audit software, are found to have a significant positive effect on audit efficiency in the regression analysis. This aligns with results from Kogan et al. (2019) stressed that with the advent of Data processing automation, with auditors no longer having to spend extensive time manually inspecting financial records, efficiency and speed have increased throughout the auditing procedure. The effect of IT on audit efficiency is also consistent with previous works by Glover et al. (2020), state that IT tools facilitate audit processes through automation, which improves the quality of auditing and reduces human mistakes. This increases the accuracy and reliability of audit results by minimizing human errors. While the advantages are overwhelming, it also provides various challenges to the auditors as well. Even though IT enhances efficiency, the auditors are expected to have a high degree of technical capability to utilize such tools. As noted by Alles et al. (2021); however, they can hinder the use of IT in some auditing environments. However, the findings from this study suggest that the improvement in efficiency of auditors who are trained and IT proficient is significantly higher, as their technical proficiency acts as a moderator strengthening the relationship between audit outcome and IT.

IT tools not only improve the accuracy of audit findings but also confirm findings of other studies (Sutton et al., 2019; Almazan et al., 2020) that are crucial to investigation of this study. IT-focused audit increasing the scope by auditing the complete transaction without sample audit data. By utilizing data analytics, auditors can discover patterns, trends, and anomalies that might go unnoticed in conventional audits, thereby improving the overall quality of audit (Kogan et al., 2019). The findings of regression data analysis of this study also prove that the presence of information technology tools facilitates audit accuracy,

while data analytics prove to be important in determining the quality of audit results. One of the key points to improving accuracy is IT having the potential to minimize human errors, which comes as a part of manual auditing process. More reliable results are extracted through sophisticated algorithms and software reduce the chance of human judgement error (Soudani, 2020). In addition, automated audit procedures allow auditors to audit information more efficiently and reliably, increasing the credibility of management reports (Sutton et al., 2019). Such a finding is in agreement with the work of Knechel et al. (2019) claimed iteratively because IT tools diminish error risk by automating repetitive tasks and generate reliable results. Nonetheless, the contribution of IT to accuracy comes with its limitations. Inadequate security measures (Baker et al., 2020; Ashford et al., 2022) can risk the integrity of the data being analyzed, which may call into question the credibility of the auditor's findings. The moderation analysis conducted in this study confirmed that cybersecurity concerns had a negative impact on the relationship between IT tools and audit accuracy. It also underscores the need for cybersecurity tools to be tested and vetted to ensure that the audit processes they operate in are improved by IT use rather than negatively impacted by it.

Furthermore, the integration of information technology in auditing significantly expands the audit's scope (Alles & Gray, 2016; Soudani, 2020), consistent with findings reported in prior research. Auditors can now review larger amounts of data more quickly and accurately, allowing them to examine the full population of detailed transaction-level data that would be too extensive to review manually (Knechel et al., 2020). The broadened audit scope is more reflective of the organization's overall fiscal condition and is crucial in today's convoluted financial landscapes. IT tools enable auditors to perform continuous audits rather than relying on periodic audits. Thanks to data analytics and AI, continuous auditing allows auditors to examine financial transactions in real-time and identify emerging problems (Almazan et al., 2020). Such a move from traditional auditing approaches to continuous auditing has great implications on audit scope, as that would allow auditors to identify and answer issues immediately, hence improving the overall efficiency of audits. This increased audit scope is particularly useful for stakeholders, providing transparency and accountability. As noted by Moeeni et al. (2021), can help enhance their confidence in the audit process by giving stakeholders a better and more timely picture of an organization's financial health through the use of IT tools.

The study highlights how the use of IT in auditing has significantly improved the efficiency and effectiveness of

the auditing process, leading to better outcomes for auditors and their clients. This is in line with the concerns of many researchers (Baker et al., 2020; Ashford et al., 2022) who say what the risk of data breach, cyberattack and other security threats of good data of its audit. The moderation analysis showed a large negative impact of cybersecurity issues on the effectiveness of IT-based audits. While advanced technologies can enhance audit efficiency and accuracy, IT tools effectiveness is dependent on the secure handling of sensitive financial data. Effective cybersecurity measures are essential for organizations to secure audit data and maintain the advantages of IT integration without compromising security. As emphasized by Knechel et al. (2020), auditors must take action with regard to areas such as cybersecurity, implementing strong security procedures, encryption protocols and regular audits of information technology infrastructure to eliminate these threatening practices. This highlights the significance of a well-balanced approach towards IT adoption, where the rewards of improved audit performance are measured against possible risks posed by cybersecurity dangers.

It was also confirmed that the technical proficiency significantly moderates the relationship between IT adoption and audit outcomes. This result correlates with the prior study by Alles et al. (2021) reiterates that the ability of IT tools to be effective in auditing is closely anchored in auditors' technical skills, as such tools are only as good as the auditors using them. IT proficiency in auditors enhances their ability to use the available tools better, which results in enhancing efficiency and accuracy of audit significantly in respect of the overall scope of audit as well. The significant moderating effect of technical proficiency emphasizes the importance of auditors mastering IT tools and data analytics. Given the rapid digital transformation in the audit practice, auditors need to undergo continuous learning and training to adapt to technological changes (Glover et al., 2020). As a result, they will be able to utilize IT tools optimally to improve auditing results and stay respected in a fast-paced profession that is still developing.

Lastly, the study revealed a positive relationship between IT adoption and transparency as well as stakeholder trust in auditing. This result is consistent with earlier work by Glover et al. (2020) contended that the use of IT tools improves the transparency of audit processes, making financial information more accurate, more timely, and more detailed for stakeholders. IT increases confidence among stakeholders, especially Investors, Regulators and the Public by broadening the scope of audits and making them more accurate. The shared significance of IT adoption and trust in stakeholders

closely links technology and transparency reporting as two major pillars of modern audit practice. With stakeholders pushing for increased transparency and reliability in financial statements, IT helps auditors facilitate meeting these demands and strengthen public trust in the audit (Alles & Gray, 2016).

5. Conclusion

This study was conducted to determine the relationship of IT on audit efficiency, audit accuracy, audit scope, and stakeholder trust and to check the moderation effects of cyber security perception and tech proficiency. The findings emphasize the various ways in which IT tools positively affect audit activity, confirming that IT improves efficiency, accuracy, and coverage of audits as well as greater stakeholder trust in auditors. Moreover, the finding that the moderating effect of technical proficiency on these relationships is positive suggests that auditors with high technical skills are better able to use IT tools in enhancing audit practices. On the other hand, a negative moderation effect on the relationship between IT usage and audit effectiveness was indicated by cybersecurity concerns, which demonstrate the extent to which cybersecurity considerations will hinder the benefits from the integration of IT into audits. These advantages highlight the importance of IT in the transformation of audits and the need for the auditors to acquire sufficient technical skills to achieve the full potential of these advantages. In addition to this, meeting cybersecurity needs is important in order for the full potential of IT in auditing to be reaped. In summary, this paper represents

an important addition to the existing literature on IT adoption in auditing and offers practical insights into how audit firms, corporate audit departments, and government bodies can effectively adopt new technologies to enhance their auditing practices.

Author contribution

Cindy Dwi Fatikasari: Contributed to the conceptualization of the research, data collection, and analysis. She also played a primary role in writing the manuscript.

Amri Amrulloh: Provided critical revisions to the manuscript, assisted in data analysis, and offered expert guidance on the research methodology and theoretical framework.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. They have no financial or non-financial interests that could have influenced the results or interpretation of this research.

Acknowledgement

The authors would like to acknowledge the support provided by Madiun State Polytechnic, particularly the Department of Accounting, for facilitating this research. Special thanks are given to the auditors who participated in the survey and provided valuable insights into the role of information technology in auditing.

Appendix A. Supplementary data

Table 1: Demographic Breakdown of Respondents

Demographic Factor	Category	Percentage (%)
Organization Type	Public Sector	40%
	Private Sector	45%
	Governmental Audit Bodies	15%
Years of Experience	2-5 years	25%
	6-10 years	40%
	10+ years	35%
Level of IT Adoption	High	55%
	Moderate	30%
	Low	15%

Table 2: Cronbach's Alpha for Questionnaire

Section	Cronbach's Alpha (α)
Section 2: IT Tools Used in Auditing	0.87
Section 3: Audit Efficiency	0.83

Section 4: Accuracy of Audit Findings	0.85
Section 5: Scope of Audits	0.81
Section 6: Cybersecurity Concerns	0.88
Section 7: Technical Proficiency	0.84
Section 8: Stakeholder Trust and Transparency	0.82

Source of data; processed by researchers 2024

Table 3: Pearson’s Correlation Coefficients between IT Use and Audit Outcomes

Variable	Audit Efficiency	Audit Accuracy	Audit Scope	Stakeholder Trust
IT Tools Used in Auditing	0.75**	0.78**	0.70**	0.65**
Technical Proficiency	0.69**	0.72**	0.68**	0.67**
Cybersecurity Concerns	-0.40**	-0.42**	-0.35**	-0.33**

Source of data; processed by researchers 2024

Table 4: Multiple Regression Analysis of IT Use on Audit Outcomes

Dependent Variable	Independent Variables	Beta Coefficient (β)	p-value
Audit Efficiency	IT Tools, Technical Proficiency	0.52**	0.001
	Cybersecurity Concerns	-0.21**	0.032
Audit Accuracy	IT Tools, Technical Proficiency	0.60**	0.000
	Cybersecurity Concerns	-0.18**	0.045
Audit Scope	IT Tools, Technical Proficiency	0.48**	0.002
	Cybersecurity Concerns	-0.15*	0.061
Stakeholder Trust	IT Tools, Technical Proficiency	0.45**	0.005
	Cybersecurity Concerns	-0.25**	0.015

Source of data; processed by researchers 2024

Table 5: Moderation Effects of Cybersecurity Concerns and Technical Proficiency on IT Usage and Audit Effectiveness

Moderator Variable	Dependent Variable	Interaction Effect	p-value
Cybersecurity Concerns	Audit Efficiency	-0.16	0.032
	Audit Accuracy	-0.14	0.040
	Audit Scope	-0.12	0.048
	Stakeholder Trust	-0.20	0.021
Technical Proficiency	Audit Efficiency	0.29	0.001
	Audit Accuracy	0.35	0.000
	Audit Scope	0.32	0.003
	Stakeholder Trust	0.27	0.008

Source of data; processed by researchers 2024

References

Abdullah, A. A. H., & Almaqtari, F. A. (2024). The impact of artificial intelligence and Industry 4.0 on transforming accounting and auditing practices. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1), 100218. <https://doi.org/https://doi.org/10.1016/j.joitmc.2024.100218>

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, 2(4), 314–324. <https://doi.org/https://doi.org/10.1002/hbe2.195>

Alawida, M., Omolara, A. E., Abiodun, O. I., & Al-Rajab, M. (2022). A deeper look into cybersecurity issues in the wake of Covid-19: A survey. *Journal of King Saud University - Computer and Information Sciences*, 34(10, Part A), 8176–8206. <https://doi.org/https://doi.org/10.1016/j.jksuci.2022.08.003>

- Alvino, F., Di Vaio, A., Hassan, R., & Palladino, R. (2021). Intellectual capital and sustainable development: a systematic literature review. *Journal of Intellectual Capital*, 22(1), 76–94. <https://doi.org/10.1108/JIC-11-2019-0259>
- Asghar, M. R., Hu, Q., & Zeadally, S. (2019). Cybersecurity in industrial control systems: Issues, technologies, and challenges. *Computer Networks*, 165, 106946. <https://doi.org/https://doi.org/10.1016/j.comnet.2019.106946>
- Bauer, T. D., Estep, C., & Malsch, B. (2019). One Team or Two? Investigating Relationship Quality between Auditors and IT Specialists: Implications for Audit Team Identity and the Audit Process. *Contemporary Accounting Research*, 36(4), 2142–2177. <https://doi.org/https://doi.org/10.1111/1911-3846.12490>
- Burak Gunay, H., Shen, W., & Newsham, G. (2019). Data analytics to improve building performance: A critical review. *Automation in Construction*, 97, 96–109. <https://doi.org/https://doi.org/10.1016/j.autcon.2018.10.020>
- Christ, M. H., Eulerich, M., Krane, R., & Wood, D. A. (2021). New Frontiers for Internal Audit Research*. *Accounting Perspectives*, 20(4), 449–475. <https://doi.org/https://doi.org/10.1111/1911-3838.12272>
- Craja, P., Kim, A., & Lessmann, S. (2020). Deep learning for detecting financial statement fraud. *Decision Support Systems*, 139, 113421. <https://doi.org/https://doi.org/10.1016/j.dss.2020.113421>
- Di Vaio, A., Hassan, R., & Palladino, R. (2023). Blockchain technology and gender equality: A systematic literature review. *International Journal of Information Management*, 68, 102517. <https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2022.102517>
- El-Den, S., Chen, T. F., Gan, Y.-L., Wong, E., & O'Reilly, C. L. (2018). The psychometric properties of depression screening tools in primary healthcare settings: A systematic review. *Journal of Affective Disorders*, 225, 503–522. <https://doi.org/https://doi.org/10.1016/j.jad.2017.08.060>
- Habibzadeh, H., Nussbaum, B. H., Anjomshoa, F., Kantarci, B., & Soyata, T. (2019). A survey on cybersecurity, data privacy, and policy issues in cyber-physical system deployments in smart cities. *Sustainable Cities and Society*, 50, 101660. <https://doi.org/https://doi.org/10.1016/j.scs.2019.101660>
- Ikegwu, A. C., Nweke, H. F., Anikwe, C. V., Alo, U. R., & Okonkwo, O. R. (2022). Big data analytics for data-driven industry: a review of data sources, tools, challenges, solutions, and research directions. *Cluster Computing*, 25(5), 3343–3387. <https://doi.org/10.1007/s10586-022-03568-5>
- Islam, M. S., Farah, N., & Stafford, T. F. (2018). Factors associated with security/cybersecurity audit by internal audit function. *Managerial Auditing Journal*, 33(4), 377–409. <https://doi.org/10.1108/MAJ-07-2017-1595>
- Jones-Smith, J. C., Knox, M. A., Coe, N. B., Walkinshaw, L. P., Schoof, J., Hamilton, D., Hurvitz, P. M., & Krieger, J. (2022). Sweetened beverage taxes: Economic benefits and costs according to household income. *Food Policy*, 110, 102277. <https://doi.org/https://doi.org/10.1016/j.foodpol.2022.102277>
- Juma'h, A. H., & Alnsour, Y. (2020). The effect of data breaches on company performance. *International Journal of Accounting & Information Management*, 28(2), 275–301. <https://doi.org/10.1108/IJAIM-01-2019-0006>
- Krieger, F., Drews, P., & Velte, P. (2021). Explaining the (non-) adoption of advanced data analytics in auditing: A process theory. *International Journal of Accounting Information Systems*, 41, 100511. <https://doi.org/https://doi.org/10.1016/j.accinf.2021.100511>
- La Torre, M., Botes, V. L., Dumay, J., & Odendaal, E. (2021). Protecting a new Achilles heel: the role of auditors within the practice of data protection. *Managerial Auditing Journal*, 36(2), 218–239. <https://doi.org/10.1108/MAJ-03-2018-1836>
- Leocádio, D., Malheiro, L., & Reis, J. C. G. dos. (2024). Auditors in the digital age: a systematic literature review. *Digital Transformation and Society, ahead-of-print*(ahead-of-print). <https://doi.org/10.1108/DTS-02-2024-0014>
- Li, H., Dai, J., Gershberg, T., & Vasarhelyi, M. A. (2018). Understanding usage and value of audit analytics for internal auditors: An organizational approach. *International Journal of Accounting Information Systems*, 28, 59–76. <https://doi.org/https://doi.org/10.1016/j.accinf.2017.12.005>
- Lokanan, M., Tran, V., & Vuong, N. H. (2019). Detecting anomalies in financial statements using machine learning algorithm. *Asian Journal of Accounting Research*, 4(2), 181–201. <https://doi.org/10.1108/AJAR-09-2018-0032>
- Lorentzon, J. I., Fotoh, L. E., & Mugwira, T. (2024). Remote auditing and its impacts on auditors' work and work-life balance: auditors' perceptions and implications. *Accounting Research Journal*, 37(1), 1–18. <https://doi.org/10.1108/ARJ-06-2023-0158>
- Manita, R., Elommal, N., Baudier, P., & Hikkerova, L. (2020). The digital transformation of external audit and its impact on

- corporate governance. *Technological Forecasting and Social Change*, 150, 119751. <https://doi.org/https://doi.org/10.1016/j.techfore.2019.119751>
- Mökander, J., Morley, J., Taddeo, M., & Floridi, L. (2021). Ethics-Based Auditing of Automated Decision-Making Systems: Nature, Scope, and Limitations. *Science and Engineering Ethics*, 27(4), 44. <https://doi.org/10.1007/s11948-021-00319-4>
- Robins, J., & Wiersema, M. F. (1995). A resource-based approach to the multibusiness firm: Empirical analysis of portfolio interrelationships and corporate financial performance. *Strategic Management Journal*, 16(4), 277–299. <https://doi.org/https://doi.org/10.1002/smj.4250160403>
- Schuetz, S., & Venkatesh, V. (2020). Blockchain, adoption, and financial inclusion in India: Research opportunities. *International Journal of Information Management*, 52, 101936. <https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2019.04.009>
- Siew, E.-G., Rosli, K., & Yeow, P. H. P. (2020). Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques (CAATTs) by audit firms in Malaysia. *International Journal of Accounting Information Systems*, 36, 100445. <https://doi.org/https://doi.org/10.1016/j.accinf.2019.100445>
- Tumpa, T. J., Ali, S. M., Rahman, M. H., Paul, S. K., Chowdhury, P., & Rehman Khan, S. A. (2019). Barriers to green supply chain management: An emerging economy context. *Journal of Cleaner Production*, 236, 117617. <https://doi.org/https://doi.org/10.1016/j.jclepro.2019.117617>