Journal of Advanced Research in Business and Management Studies

Journal homepage:
https://karyailham.com.my/index.php/arbms/index
ISSN: 2462-1935

The Impact of Audit Quality and Technology Accounting Usage on Auditor Effectiveness: The Moderating Role of Educational Attainment

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ARTICLE INFO

Article history:
Received 26 November 2024
Received in revised form 18 January 2025
Accepted 3 February 2025
Available online 30 March 2025

Keywords:
Audit quality; auditor effectiveness; technology accounting usage; educational attainment; human capital theory

ABSTRACT

This study investigates the relationships between audit quality, technology accounting usage, and auditor effectiveness, with a particular focus on the moderating role of educational attainment. Drawing on Human Capital Theory and the Resource-Based View, the study posits that higher levels of education strengthen the positive impacts of both audit quality and technology usage on auditor effectiveness. Using data from 189 auditors in Jordan, this study employs a structural model in Smart PLS 4 to test the proposed relationships. The findings reveal that both audit quality and technology accounting usage significantly enhance auditor effectiveness. Additionally, educational attainment moderates the effect of accounting technology usage on auditor effectiveness. These results highlight the importance of investing in both educational development and technology adoption to enhance audit practices. Implications for audit firms, policymakers, and future research are discussed.

1. Introduction

Auditors must be effective to ensure financial reporting, corporate governance, and organisational responsibility. Competent auditors detect financial misstatements, enforce rules, and validate strong internal control systems [1]. Due to its importance in capital market transparency and efficiency, audit quality has been a major focus for scholars and practitioners. Research has focused on auditor independence, audit firm size, and audit tenure, but not on auditor educational level's moderating effect [2]. Emergence of accounting technologies has made technology in accounting more relevant to modern auditing, although its impact on auditor effectiveness is unknown. This study emphasizes the moderating role of education on audit quality, accounting technology, and auditor effectiveness [3].

Education is essential to professional advancement, particularly in complex disciplines like auditing. Human Capital Theory states that educational investments boost individual capacities and performance [4]. Auditors need higher education to do successful audits since it improves cognitive ability, critical thinking, and technical expertise. The Resource-Based View (RBV) holds that

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https://doi.org/10.37934/arbms.38.1.5969

advanced-educated auditors are strategic assets for audit companies, improving audit quality. Existing research does not examine the moderating role of formal education on audit quality and auditor effectiveness [5,6].

Technology in accounting is a noteworthy but understudied part of modern auditing. Auditing has changed due to financial market complexity, globalization, and information technology [7]. Auditors now use data analytics, audit software, and cloud-based accounting systems to handle large data volumes, execute real-time audits, and improve ratings [8]. Accounting technology may help auditors find errors and improve audit productivity [9]. Technology is increasingly important to audit procedures, but its role as an independent variable impacting auditor effectiveness and quality has not been well examined [10].

This research suggests that auditor education may moderate the association between audit quality and technology accounting utilisation on auditor effectiveness. Previous study has studied audit quality and professional qualifications, but formal education and modern technology integration in auditing have received less attention [11,12]. Higher education teaches technical capabilities and analytical and evaluative skills needed to use technology in auditing. This research examines how bachelor's, master's, and PhD degrees affect audit quality, technology use, and auditor effectiveness [13].

Education and technology in audit practice are increasingly important for regulators, policymakers, and audit companies in the knowledge-driven economy [14]. The International Federation of Accountants (IFAC) and the American Institute of CPAs (AICPA) have stressed the importance of professional development and technology in auditor proficiency [15,16]. Audit quality literature often ignores the relationship between formal education and technology use. This research examines how educational levels, technology, and audit quality and results affect auditor effectiveness [17].

Since audit quality, technology utilisation, and educational attainment are becoming increasingly significant, less is known about their implications on auditor effectiveness. Many research have evaluated audit quality and outcomes, but few have studied how technology and education attenuate these correlations [18,19]. This study evaluates education's moderating influence on audit quality, accounting technology, and auditor effectiveness. This hypothesis suggests that auditors with more education and accounting technology execute better audits owing to their superior problem-solving abilities, financial system understanding, and capacity to employ technology to overcome audit difficulties. More education enhances the favorable link between audit quality, technology use, and auditor effectiveness.

This quantitative research employs Smart PLS regression analysis to explore how education influences audit quality, technology accounting utilisation, and auditor effectiveness. The study sample comprises Jordanian auditors with various education, technology, and audit experience. This research will demonstrate to academics and practitioners the need to combine auditing education with technology. This research analyses how education and technology impact audit quality and effectiveness. Audit outcomes depend on human capital and technology. This study may influence auditor education, professional growth, and strategic decisions in complex, technology-driven audit organizations to enhance service quality. Modern financial market needs require auditors to explore how education and technology impact audit quality and effectiveness. Literature review, methodology, results, discussion, implication, and conclusion follow.

2. Literature Review and Hypotheses Development

2.1 Auditors' Effectiveness

Auditor effectiveness is essential for financial account accuracy and dependability. Successful audits provide regulatory compliance, transparency, and financial reporting accuracy [20]. Corporate governance depends on it giving investors, regulators, and creditors accurate information for decision-making. Audits reveal financial misstatements, assess internal controls, and prevent fraud and deception. Auditor effectiveness depends on competence, independence, auditing standards, and professional skepticism [21]. Along with individual qualities, audit company size and structure, resource accessibility, and advanced technology deployment affect auditor performance [22]. Greater resources allow bigger audit firms to invest in training, technology, and people. It improves auditors' abilities. Data analytics, AI, and blockchain have increased auditor performance [23,24]. These tools help auditors detect irregularities in vast datasets and analyze risk more accurately, boosting audit quality and effectiveness. Increased auditor effectiveness is essential for financial stability and transparency, although it is often challenging [25,26]. Auditors must constantly prepare for modern financial systems, rising regulatory requirements, and fast technological innovation. Auditor effectiveness involves ongoing education, technology, and professional development [27,14].

The increasing economy and complex banking sector in Jordan make auditors' effectiveness a crucial problem. Jordan's financial services and capital markets have transformed the economy in recent decades. Recent advances need advanced auditing approaches to assure financial reporting reliability and investor confidence. Despite these developments, Jordan's auditing profession confronts issues that may hinder auditor effectiveness. Audit quality discrepancy among firms is serious. International companies in Jordan have greater resources, technology, and auditor training, improving auditor effectiveness. Smaller local audit firms may struggle to invest in new technology and professional development, affecting audit quality and effectiveness. Professional and educational certifications determine Jordanian auditor effectiveness. Although professional certifications and continuing education differ, many Jordanian auditors have degrees in accounting or related subjects [28-30].

JACCP establishes auditing standards and ethics. Smaller audit companies may find these standards' enforcement techniques inadequate. Regulatory oversight and auditing standard enforcement may boost auditor performance. Technology presents various challenges for Jordanian auditors [1,6]. Although technology utilisation in Jordan is relatively low, larger audit firms are employing audit software and data analytics tools. Complex audits may be difficult for smaller organizations without the finances to invest in new technologies [31,32]. Jordanian auditors' performance also relies on education. Complex financial audits are best performed by master's or PhD-level auditors, according to recent research. Auditors learn critical thinking, technical skills, and auditing standards in higher education, improving audit outcomes [15,33]. Financial markets and technology move quickly, requiring more professional development [34]. Improved auditor education and certification campaigns may strengthen the profession in Jordan.

2.2 Audit Quality and Auditor Effectiveness

Financial reporting accuracy, dependability, and transparency depend on audit quality. Quality audits are essential for detecting financial misstatements, assessing internal controls, and meeting regulatory requirements. Audit quality is the likelihood that an auditor will find and report substantial financial statement misstatements. Research has studied how auditor independence,

business size, and tenure impact audit quality [23]. The highlighted criteria improve audit effectiveness, corporate governance, and organizational accountability.

Auditors with technical competence, professional skepticism, and decision-making abilities can perform high-quality audits [15]. Professional auditors ensure comprehensive, precise audits that meet professional standards. There is a growing recognition of the importance of human resources, particularly education, in audit quality and effectiveness. Previous research has focused on company-level determinants and audit firm characteristics. Compliance with standards and careful audit procedures improve audit accuracy and dependability, according to prior research [28,35,36]. This research suggests that audit quality improves auditor performance.

H1: Hypothesis Audit quality greatly improves auditor performance.

2.3 Impact of Accounting Technology on Auditor Effectiveness

Technology has transformed auditing. Technology accounting systems including cloud platforms, data analytics tools, and audit software have changed auditing. Auditors may handle vast amounts of data more efficiently, enhance assessment accuracy, and finish audits faster using these tools. Technology improves audit efficiency, accuracy, and outcomes [37]. The present auditing scenario, with increasing financial reporting complexity and data volume, requires accounting technology [38]. Advanced technologies allow auditors to do more extensive audits, use complicated data analysis techniques, and increase productivity [39]. Despite the expanding use of technology in auditing, research on its implications on auditor effectiveness is few [40]. Technology in accounting may improve auditor performance by providing better tools. Regularly using modern technological instruments in audits improves accuracy and efficiency, increasing effectiveness [41, 42]. Therefore, this study proposes that accounting auditing technology affects positively the auditor effectiveness.

H2: Accounting technology improves auditor performance.

2.4 Moderating Role of Education

Educational attainment is proposed to moderate technology accounting adoption and auditor effectiveness. Auditors need technical and cognitive skills to use technology in auditing. Higher education may help auditors use technology for difficult audits [30]. Auditors need a solid grasp of accounting and data analysis to utilize sophisticated audit software and data analytics technologies [29]. Advanced-educated auditors are more likely to accept and use new technology [36]. Higher education helps auditors harness technology, regulating the association between technology accounting utilisation and auditor effectiveness and improving audit results [33].

Education is essential to professional effectiveness. Becker's 1964 Human Capital Theory states that educational investments increase cognition, decision-making, and performance. Advanced education should provide auditors the technical knowledge, analytical skills, and critical thinking needed to perform successful audits [35]. Education provides a foundation in accounting and auditing concepts and problem-solving abilities for navigating financial systems and regulations [32]. Despite the importance of education, audit quality literature seldom discusses how formal education affects audit results [28]. Professional certificates like CPA and CA have received the most research, whereas formal degrees like bachelor's, master's, and doctorate degrees have received less [34]. Advanced education provides auditors with academic and practical knowledge to traverse modern financial reporting [31]. Since educated auditors have better cognitive and analytical skills, audit quality and effectiveness are likely to improve [14]. Advanced-educated

auditors are better at using their knowledge and skills to improve audit quality and effectiveness [27]. Education is expected to moderate the influence of audit quality on and accounting technology usage on auditor effectiveness.

H3: Education moderates the effect of audit quality on auditor effectiveness.

H4: Education moderates the effect of accounting technology usage on auditor effectiveness.

3. Research Methodology

This quantitative study examines audit quality, accounting technology usage, and auditor effectiveness, highlighting auditor education as a moderator. This study surveys Jordanian auditors at several audit companies using a cross-sectional approach. The quantitative technique allows statistical analysis of variables and their interactions, making hypothesis testing easier. Jordanian audit company professionals are the target population of this study. The population includes auditors with bachelor's, master's, and doctorate degrees from organizations of all sizes and industries. The study uses stratified random sampling to ensure representation of educational levels and technological use.

A statistical power analysis chose 300 auditors for statistical testing. Jordanian audit company auditors completed a standardized questionnaire online. Professional auditing networks received an email questionnaire on audit quality, technology accounting utilisation, auditor effectiveness, and education. Audit quality evaluation, covering auditing standards, auditor independence, professional skepticism, and audit procedural comprehensiveness. The items were based on prior study scales [23]. Accounting technology, usage includes cloud-based accounting systems, data analytics, and audit software. The items were based on auditing technology adoption literature [37]. Auditor effectiveness which is related to the ability of auditor to assess and detect financial misstatements, assess internal controls, and create reliable audit reports was measured based on Duh *et al.,* [15]. Educational achievement by greatest formal education and relevant certificates (e.g., CPA, CA). All the items were measured using five Likert scale. The response rate was 66%, with 198 valid replies from 300 surveys. The sample size is sufficient for regression analysis of hypotheses with numerous independent variables and interaction factors. However, nine responses were removed due to missing values and outliers. The data is normally distributed and no issue of multicollinearity. Total completed responses are 189. These responses will be analyzed in this study. The data is analyzed using SPSS and Smart PLS4. Measures reduced common method bias. Randomizing the questionnaire's independent and dependent variable questions reduced respondents' ability to predict associations. The data gathering technique kept respondents anonymous to reduce socially desired replies. A Harman's single-factor test showed that no one factor explained most of the variation, showing that common technique bias was not a substantial concern.

4. Findings

4.1 Characteristics of the Sample

A total of 189 professional auditors from Jordanian audit businesses make up the research sample. Auditors in the sample had diverse educational, career, and technical backgrounds. The sample included auditors with bachelor's, master's, and doctorate degrees. The sample includes auditors from different business sizes and industries, providing a wide view of Jordanian auditing procedures. Of the responders, 62% have bachelor's degrees, 28% have master's, and 10% have doctorates.

4.2 Level of the Variables

The descriptive data for audit quality, technology accounting usage, and auditor effectiveness provide a preliminary assessment of auditor responses. On a five-point Likert scale, higher ratings indicated stronger perceptions or higher use and efficacy. The average audit quality score is 3.85, indicating that respondents generally think their business' audit processes and auditing standards are good. The average score for technology accounting utilisation is 3.67, suggesting that most auditors use audit software and data analytics somewhat in their audits. The Jordanian auditing profession is integrating technology more, although not fully. The average score for auditor effectiveness is 3.92, indicating that respondents believe they are successful in auditing, particularly in detecting financial misstatements and ensuring regulatory compliance. The descriptive data show that the sample auditors rate their audit quality and effectiveness highly and that technology is becoming more important in audit practice, despite its continual development.

4.3 Measurement Model

The analyses of Smart PLS were conducted based on the suggestions of [43]. The research used Smart PLS 4 to evaluate measurement model reliability and validity before evaluating hypothesized connections in Table 1. A variety of indications confirmed the model's accuracy. The AVE approach assessed convergent validity. All constructs' AVE values above 0.50, suggesting that their elements converged to reflect the underlying variable. Audit quality, technology accounting usage, and auditor effectiveness had AVE values of 0.72, 0.68, and 0.75, indicating convergent validity. Composite reliability assessed build internal consistency. All CR values above 0.70, confirming build dependability. CR scores of 0.89, 0.87, and 0.90 for audit quality, technology accounting usage, educational attainment, and auditor effectiveness indicate good internal consistency. The HTMT ratio examined discriminant validity. All heterotrait-monotrait (HTMT) ratios were below 0.85, indicating construct differentiation.

Table 1
Reliability and Validity

Variable	CA	CR	AVE	1	**2**	**3**
Audit quality	0.88	0.89	0.72	-		
Technology accounting usage	0.84	0.87	0.68	0.57		
Auditor effectiveness	0.89	0.90	0.75	0.41	0.55	-

4.4 Structural Model

Smart PLS 4 examined the correlations between audit quality, technology accounting usage, auditor effectiveness, and educational achievement in the structural model. The findings are shown in Figure 1 and in Table 2. The R^2 score for auditor effectiveness was 0.447, indicating that the model explains 44.7% of the variation.

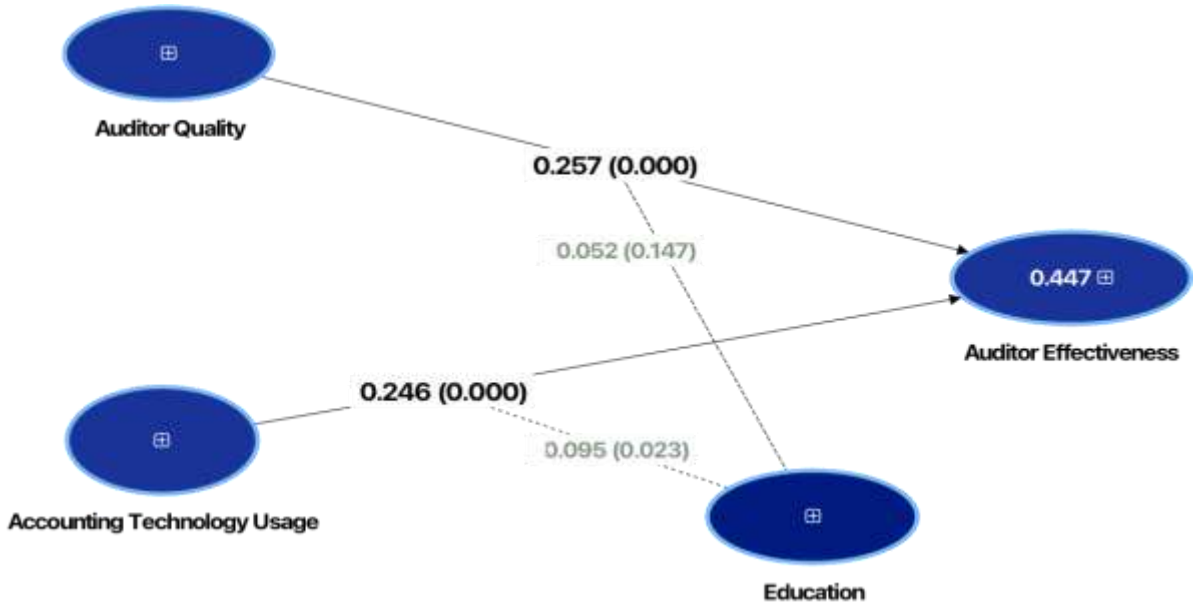

Fig. 1. Structural model

Value in the figure 1 shows the results of hypotheses testing. It shows that the effect of audit quality on auditor effectiveness is positive and significant (β = 0.257, p < 0.01), supporting H1. Audit quality greatly improves auditor effectiveness and performance. Actively following auditing standards and procedures improves audit performance, notably in detecting misstatements and ensuring compliance. The favorable and substantial association between technology accounting usage and auditor effectiveness (β = 0.246, p < 0.01) supports H2. Auditor effectiveness improves with new technology like audit software and data analytics. Technology helps auditors evaluate large data sets and spot financial problems. Educational attainment did not moderate the effect of audit quality on auditor effectiveness. However, it moderated the effect of accounting technology usage on auditor effectiveness (β = 0.095, p < 0.05). This suggests that advanced-educated auditors use technology better to improve audit performance.

5. Discussion and Implications

This research sheds light on audit quality, accounting technology usage, auditor effectiveness, and educational attainment's moderating role. Supported hypotheses showed that audit quality and technology significantly affect auditor effectiveness. The positive and significant relationship between audit quality and auditor effectiveness supports previous research showing that high audit quality helps auditors detect misstatements and comply with regulations [23]. Auditors who follow strict auditing standards, maintain professional skepticism, and do thorough audits are more likely to succeed. Improving audit quality improves audit function effectiveness. The study's results on accounting technology and auditor effectiveness show that technology's role in auditing is evolving. The positive link between technology usage and auditor effectiveness suggests that auditors using audit software, data analytics, and cloud-based technologies may perform more complete and accurate audits. Recent study shows that technology improves audit efficiency, reduces errors, and streamlines financial data processing [37,38]. Technology helps auditors navigate complicated financial reporting and regulatory systems.

Educational attainment moderates significantly the effect of accounting technology usage on auditor effectiveness. The results imply that auditors with master's or doctorate degrees have a stronger positive link between technology use and effectiveness. According to Human Capital

Theory, education enhances cognitive, problem-solving, and technical skills, preparing auditors for difficult audit duties [2,3]. According to the RBV, well-educated auditors provide excellent audit services by providing intellectual capital [44]. Higher education gives auditors the theoretical knowledge and analytical abilities they need to use technological tools and meet strict audit criteria. Advanced knowledge makes auditors more likely to use these techniques, boosting their efficacy. Audit companies and politicians must engage in auditor education to improve audit results, since this discovery has major ramifications [4,6,29].

This research has several practical consequences for audit businesses, policymakers, and the auditing profession. The moderating influence of education shows that audit companies should stress auditor education. Organizations should encourage auditors to pursue further degrees or certificates and provide professional development. Investing in auditor education improves audit quality and team performance. Professional groups and authorities should increase auditor education, particularly as financial reporting becomes more complicated, and technology becomes more important.

The link between sophisticated accounting technology and auditor effectiveness shows that auditing methods must include modern technology. To improve efficiency and accuracy, audit companies should invest in data analytics technologies, automated audit systems, and cloud-based platforms. These technologies should improve audit quality and efficiency, as well as customer satisfaction due to financial misstatement identification and fraud prevention. The fact that audit quality greatly impacts auditor effectiveness emphasizes the need for rigorous audit methods. Organizations must ensure their audit teams follow strict auditing standards, are independent, and are skeptical. Regulatory agencies must improve auditing standards and assess business compliance to improve audit quality. Given the moderating effect of education, audit companies should tailor their training programs to their auditors' educational backgrounds. Auditors with fewer educational degrees may benefit from modern technological training and auditing standards, while those with higher qualifications may strengthen their strategic and analytical abilities. This customized training may improve auditors' performance across educational backgrounds.

The study suggests that politicians and professional bodies reconsider auditor education criteria. Higher education improves audit quality and technology use, which may develop the auditing profession. Auditors may get ongoing professional development from regulatory organizations to keep up with changing audit requirements and technology. Audit businesses that invest in modern auditing technology should get financial incentives or tax advantages from governments and regulatory agencies. Technology improves auditor effectiveness, therefore regulatory frameworks may promote its use in auditing, particularly in sectors where technology adoption is early.

6. Conclusion

This research confirms the importance of audit quality and accounting technology on auditor effectiveness. These findings emphasize the importance of education in strengthening these ties. Advanced education helps auditors use technology better and provide better audit results. The results emphasize the need for audit companies to invest in technology and auditor education to improve audit quality and effectiveness, which has major implications for academic research and professional practice. The findings of this study are limited to Jordanian auditing industry, and it limited to auditors in Jordan. However, to overcome these limitations, future studies are recommended to examine other countries and include more auditors and other individual who have link with auditing. This study offers several research prospects. Researchers might study the

technologies that most affect auditor performance. Future research might study how AI, blockchain, and data analytics affect audit results. Second, longitudinal studies might assess how education and technology integration affect audit quality and effectiveness over time. Future research should examine how cultural and institutional variables affect education, technology, and audit effectiveness across locations and auditing environments. The findings show that audit firms must invest in auditor education and innovative technology to improve audit results. The results highlight the relevance of human capital and technical resources in shaping the auditing profession for audit companies, regulators, and legislators.

Acknowledgement
This research was not funded by a grant.

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