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Exploring auditor adaptability in the digital era through levels of expertise: The role of IT literacy

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ABSTRACT

As digital transformation accelerates, auditors must adapt to technologically advanced environments, which challenge traditional audit practices and require new skills. This study investigates how auditor expertise and IT literacy interact to influence adaptability in a digital context. Through a two-way ANOVA, we examine how varying levels of expertise and IT literacy jointly impact auditors' adaptability. Expertise and IT literacy levels are calculated using quartile and tertile assumptions, categorizing respondents into distinct groups. Findings indicate that auditors with both high expertise and IT literacy demonstrate significantly greater adaptability, underscoring the importance of digital skills alongside traditional competencies. IT literacy strengthens auditors' capacity to navigate complex digital systems, enhancing adaptability, while low IT literacy can restrict adaptability and hinder performance. Additionally, this study highlights key benefits and challenges in adapting to digital practices, noting that digital skills can improve audit quality if emphasized in training programs. Although digital transformation offers clear advantages, it presents challenges, such as heightened demands for digital proficiency and the need for continuous development to reduce risks. As the audit profession evolves, auditor adaptability—supported by IT literacy—will be critical in thriving within digital landscapes. The implications underscore the need for audit firms to integrate IT literacy training with traditional skill development to prepare auditors effectively for the future of digital auditing.

1. Introduction

The ongoing digital transformation has reshaped the landscape of many industries, with the auditing profession being no exception. Emerging technologies such as artificial intelligence (AI), blockchain, data analytics, and robotic process automation (RPA) are revolutionizing audit processes by increasing efficiency, enhancing risk detection, and improving accuracy (Almufadda & Almezeini, 2022; Fedyk, Hodson, Khimich, & Fedyk, 2022; Omoteso, 2012). Auditors, however, face new challenges in adapting to these advancements, necessitating a blend of traditional audit expertise and digital literacy to effectively navigate the changing environment (Tiberius & Hirth, 2019). This transformation has led to a growing recognition of the need for auditors not only to possess technical expertise but also to be adaptable to rapidly evolving technological landscapes (Frishammar, Richtner, Brattström, Magnusson, & Ölme, 2019; Susskind & Susskind, 2022).

While the importance of auditor expertise in ensuring audit quality

has been extensively studied, there is a gap in the literature regarding how auditors' IT literacy interacts with their expertise to impact their adaptability to digital transformation (Lindawati & Handoko, 2022; Manita, Elommal, Baudier, & Hikkerova, 2020; Sirois, Bédard, & Bera, 2018). Previous research has largely focused on the standalone influence of auditor expertise or technological knowledge on audit performance, leaving an unexplored gap in how these two factors interact to influence adaptability (Tan & Libby, 1997). As firms increasingly adopt advanced technologies, auditors' ability to remain adaptable may depend on their proficiency with IT tools and systems, in addition to their audit expertise.

This research investigates how auditor expertise contributes to adaptability within digital transformation contexts, particularly examining IT literacy's moderating effect on this relationship. The goal is to clarify how auditor expertise interacts with IT literacy to either enhance or limit adaptability in technology-focused environments. To address these aims, the study poses key research questions: "To what extent does

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auditor expertise influence adaptability in the face of digital transformation? To what extent is IT literacy required as part of an auditor's expertise to adapt effectively to auditing in the digital era?"

This paper contributes to existing literature by providing insights into the combined effects of auditor expertise and IT literacy on adaptability in a digital audit environment. The findings will not only fill a critical gap in literature but also offer practical implications for audit firms looking to enhance their teams' adaptability by emphasizing IT training in conjunction with developing audit expertise (Curtis, Jenkins, Bedard, & Deis, 2009; Rumasukun, 2024). By examining the moderating role of IT literacy, this study highlights the importance of integrating technological competencies into the training and development of auditors (Nazarova et al., 2021).

Furthermore, this study is grounded in dynamic capabilities framework which suggests that individuals' unique resources and capabilities contribute to organizational success. Auditor expertise, viewed as a critical resource, can be enhanced through the development of IT literacy to drive greater adaptability to technological change. In this context, the study will explore how the combination of these resources positions auditors to handle the complexities of digital transformation in auditing. A quantitative research approach will be adopted, using a structured questionnaire to collect data from external auditors. The study will utilize a two-way ANOVA (analysis of variance) to investigate the relationship between auditor expertise and adaptability, as well as the moderating effect of IT literacy. This analytical approach is well-suited for examining interactions between independent and moderating variables, offering a robust framework for comprehensively analyzing these relationships (Hayes, 2018).

Accordingly, the study will focus on auditors from different types of firms including ones that have integrated digital tools into their audit processes, such as the use of AI, blockchain, and data analytics. While this provides insight into how IT literacy and expertise interact in tech-savvy environments, the findings may not be fully generalizable to small audit firms with limited digital infrastructure.

The paper is structured as follows: Section 2 reviews the relevant literature on auditor expertise, IT literacy, and adaptability in the context of digital transformation along with the theoretical framework. Section 3 outlines the research methodology, including the sampling strategy, data collection, and analysis techniques. Section 4 presents the findings and discusses the implications of the results. Finally, Section 5 concludes the study, providing suggestions for future research and practical recommendations.

2. Literature review and theoretical framework

In recent years, the auditing profession has experienced a rapid evolution, driven primarily by technological advancements that have fundamentally transformed how audits are conducted (Shaikh, 2005; Vitali & Giuliani, 2024). The increasing integration of digital tools, data analytics, blockchain, artificial intelligence (AI), and machine learning in auditing processes has created a need for auditors to develop new skills and competencies (Cristea, 2020; Lamboglia, Lavorato, Scornavacca, & Za, 2021; Tarek, Mohamed, Hussain, & Basuony, 2017). Among these competencies, auditor expertise and IT literacy have emerged as critical factors influencing an auditor's ability to adapt and ensure effective auditing processes in this evolving landscape (Pratolo & Solikhati, 2021; Feliciano & Quick, 2022; Appelbaum, Showalter, Sun, & Vasarhelyi, 2021a, 2021b; Manita et al., 2020). This literature review explores the current state of research on how auditor expertise and IT literacy impact auditors' adaptability to the digital era, highlighting key findings, trends, and gaps (Rabbani, 2024).

Traditionally, auditor expertise has been centered on experience, technical skills in conducting audits, knowledge of accounting principles, regulatory frameworks, and the ability to detect irregularities in financial statements which are essential for ensuring high-quality audit outcomes (Rahman & Zirur, 2023; Azizi, Hakimi, Amiri, & Shahidzay,

2024). Research shows that experienced auditors demonstrate a higher ability to adapt to changes, identify risks, and provide accurate audit assessments (Nelson & Tan, 2005). Indeed, auditors must interpret complex standards like the International Standards on Auditing (ISA) and International Financial Reporting Standards (IFRS) to ensure compliance and accuracy in financial reporting (Iatridis, 2010). Proficiency in these standards essential for transforming financial statements into credible information, ensuring compliance with both local and international reporting requirements (Choi & Yoon, 2014). Meanwhile, staying updated with regulatory changes is another critical aspect of auditing expertise. Experienced auditors are better equipped to handle these changes, apply professional skepticism, and ensure audit quality (Hurt, Brown-Libur, Earley, & Krishnamoorthy, 2013). Moreover, auditors also play a crucial role in detecting fraud and analyzing financial performance. Techniques such as ratio analysis, trend analysis, benchmarking, and sampling are essential for identifying risks and inconsistencies in financial data (Wong & Venkatraman, 2015). Problem-solving skills further equip auditors to handle complex situations, especially when evidence is ambiguous, and help them make informed decisions (Libby & Frederick, 1990).

However, as auditing practices become more technology-driven, traditional expertise alone is insufficient (Tran & Ha, 2021; Sophia & Siham, 2024). In the digital era, expertise is evolving to include proficiency in using digital audit tools, data analytics, and understanding blockchain technologies (Qasim & Kharbat, 2020; Rahman & Zirur, 2022). As Foteh and Lorentzon (2021) point out, the future of auditing will be significantly shaped by digitalization, though the transformation is expected to be incremental rather than radical. Auditors must not only remain knowledgeable about financial regulations but also adapt to the new digital environment.

Furthermore, research by Feliciano and Quick (2022) has shown that auditors in the United Kingdom and the United States are increasingly adopting digital audit practices. These changes are driving the need for auditors to enhance their expertise in digital technologies to manage remote audits, automated processes, and blockchain adoption (Vitali & Giuliani, 2024). In parallel, studies conducted by Betti and Sarens (2021) also emphasize that auditors need to be proficient in using advanced technologies such as artificial intelligence and data analytics to ensure efficiency and accuracy in audits. Auditors with higher IT literacy are better equipped to leverage their expertise to adapt to technological changes in their work environment (Appelbaum et al., 2021a). According to a systematic review by Pizzi, Venturelli, Variale, and Macario (2021), the digital transformation in auditing is heavily dependent on the auditor's ability to effectively utilize digital tools, a skill that is inherently tied to their level of IT literacy. This research suggests that IT literacy not only improves an auditor's ability to perform digital audits but also enhances their overall adaptability by enabling them to transition smoothly between traditional and digital audit practices.

In a similar vein, Woolf and Silver (2017) demonstrated through thematic analysis that auditors with a strong foundation in IT literacy are more likely to respond positively to the challenges posed by digital auditing tools. This adaptability is critical as it enables auditors to maintain audit quality while integrating new technologies into their work. Additionally, researchers emphasize the need for continuous professional development in both technical and IT skills to stay abreast of new technologies (Eulerich, Theis, & Stewart, 2022).

In the same sequence of ideas, Appelbaum et al. (2021a, 2021b) emphasized that the digitization of the accounting profession requires auditors to possess strong digital literacy skills. Their study in Indonesia showed that digital literacy significantly influences auditors' ability to adopt new technologies, leading to more effective and accurate audits (Appelbaum et al., 2021a, 2021b). This underscores the importance of continuous learning and adaptation for external auditors to stay competitive in the digital age. Ferri, Spanò, Ginesti, and Theodosopoulos (2021) highlighted the low IT proficiency among auditors, noting that

many external auditors lack the necessary skills to audit complex IT systems, such as blockchain and data analytics. They recommend that audit firms invest more in IT training and education to improve auditors' adaptability and effectiveness in digital audits (Ferri et al., 2021). Similarly, Rahman and Ziru (2022) demonstrated that auditors' IT expertise significantly enhances audit quality, particularly when clients have highly digitalized operations. Their findings underscore the importance of aligning auditor expertise with the digital capabilities of their clients, as this helps mitigate audit risks and ensures high-quality audits (Adiloglu & Gungor, 2019; Rahman & Ziru, 2022).

However, some studies suggest that high levels of expertise may sometimes hinder adaptability, as experienced auditors may rely on established routines and resist changes (Farcane et al., 2023). Furthermore, auditors with significant expertise may lack motivation to develop IT skills, relying on traditional audit methods (Curtis & Payne, 2014). Conversely, younger, IT-literate auditors may lack the professional judgment and experience needed to navigate complex audit scenarios (Tan & Libby, 1997). This suggests that achieving adaptability requires a balanced approach where expertise and IT literacy are developed concurrently. This finding indicates a potential gap in understanding how expertise can be balanced with flexibility in the digital era, where adaptability is crucial. The literature points to the need for further exploration of how expertise can be leveraged to enhance adaptability, particularly when combined with IT skills.

While audit expertise and IT literacy are individually important, their combined effect on adaptability in the digital era has received limited attention in existing literature. Adaptability is defined as the ability to adjust one's methods, tools, and strategies in response to changing environments and technologies (Barr-Pulliam, Brown-Liburd, & Munoko, 2022; Pulakos, Arad, Donovan, & Plamondon, 2000). In the context of auditing, adaptability involves integrating digital tools into audit processes, responding to evolving client needs, and maintaining high audit quality in a technologically advanced landscape.

Although there is ample research on audit expertise and IT literacy individually, there are notable gaps regarding their combined impact on adaptability in the digital era. Specifically, few empirical studies have investigated how the interplay between audit expertise and IT literacy affects adaptability, especially in dynamic digital environments. Given the rapid evolution of technologies such as AI, blockchain, and data analytics, there is a need for more up-to-date research exploring how auditors with varying levels of expertise and IT literacy, will adapt to this technology driven environment, especially in the Lebanese context which can be similar and profitable for similar region.

Literature predominantly uses frameworks such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) to explain the adoption of technology in auditing (Ajzen, 1991; Davis, 1989). However, these models often fail to account for the nuanced interplay between expertise and adaptability in digital contexts. There is an opportunity to develop more comprehensive frameworks that integrate factors such as experience, technological skills, and adaptability behaviors.

In the digital era, the adoption of technology in auditing requires more than just understanding its perceived usefulness or ease of use, as outlined in the Technology Acceptance Model (TAM) (Davis, 1989) and the Theory of Planned Behavior (TPB) (Ajzen, 1991). These traditional models fail to fully capture the complex interplay between auditors' expertise, adaptability, and their technological skills. A more comprehensive approach can be found in the Dynamic Capabilities Framework. This framework provides a robust foundation for examining auditor adaptability in the digital era, particularly in relation to expertise and IT literacy. Moreover, it emphasizes the processes through which organizations and professionals sense opportunities, seize them, and transform resources to maintain competitiveness in dynamic environments (Tece et al., 2007). In today's rapidly evolving technological landscape, auditors are required to adapt continuously, integrating digital literacy into their expertise to remain effective. This involves not only

recognizing emerging technologies but also reconfiguring their processes and skills to leverage these innovations effectively (Ongena, 2023). In fact, the ability to develop, expand, and adapt resources and processes, as highlighted by the dynamic capabilities' framework, is essential for maintaining a competitive edge in fast-evolving technological environments (Hanafizadeh & Alipour, 2024). This is consistent with Endres, Endres, and Berg (2018) who stress that identifying changes in technology is a crucial component of dynamic capabilities to ensure adaptability in evolving business environments. Once these opportunities are identified, seizing them requires auditors to possess IT proficiency and digital expertise. Ben Ghrbeia and Alzubi (2024) found that digital competencies are essential to enhancing organizational responsiveness and ensuring effective digital integration.

In the same sequence of ideas, Konopik, Jahn, Schuster, Hoßbach, and Pflaum (2022) stress that digital transformation success requires building organizational capabilities that facilitate the ability to sense and seize digital opportunities. For auditors, this translates to identifying emerging risks and opportunities associated with new IT systems, enhancing their audit processes with digital tools, and aligning audit procedures with digital innovations. Their framework underscores the necessity for ongoing skill development, enabling auditors to remain agile and responsive to technological changes in their field. Similarly, Heubeck (2023) highlights the role of dynamic managerial capabilities, which can be applied to auditing leadership and strategy. Audit firms require managers who can guide their teams through the challenges of digital transformation by investing in IT literacy training, adopting new technologies, and reconfiguring audit workflows. Managers with strong dynamic capabilities can enhance the adaptability of auditors by creating a culture that supports continuous learning and innovation (Seppanen, Ukko, & Saunila, 2025), which, in turn, improves firm performance and audit quality in digitally advanced environments.

The significance of these variables becomes evident in the context of digital auditing, where technological disruptions have reshaped the audit landscape. Auditors now face the challenge of evaluating increasingly complex systems and datasets, making IT literacy indispensable. VIDAČAK and KAPO (2024) highlighted that IT capabilities are essential for advancing digital transformation within internal audit functions, reinforcing the need for adaptability at both individual and organizational levels. The Dynamic Capabilities Framework thus offers a comprehensive theoretical model for understanding and enhancing auditor adaptability in the digital era. By emphasizing IT literacy, auditor expertise, and adaptability, this framework supports the continuous evolution of auditing practices in response to technological advancements, ensuring both relevance and reliability in audit outcomes.

Hence, this aligns with the main hypothesis (H1): *Auditor expertise positively influences auditor adaptability in the digital era*; and the moderating hypothesis (H2): *IT literacy moderates the relationship between auditor expertise and auditor adaptability*.

The conceptual framework of this study is shown below (Fig. 1).

3. Methodology

3.1. Research design and data collection

The study adopts a quantitative research design to explore the relationship between auditor expertise, IT literacy, and adaptability. The approach involves the use of structured questionnaires to collect numerical data, which will then be analyzed using statistical tools. This allows for objective testing of the proposed hypotheses (Bryman, 2016). The study uses cross-sectional survey method, where data is collected from a sample of auditors at a single point in time (Blokdiijk, Driehuisen, Simunic, & Stein, 2006). This design is efficient for understanding the current state of auditor adaptability in the digital era and identifying correlations between the independent and dependent variables (Saunders, Lewis, & Thornhill, 2016). The primary method of data

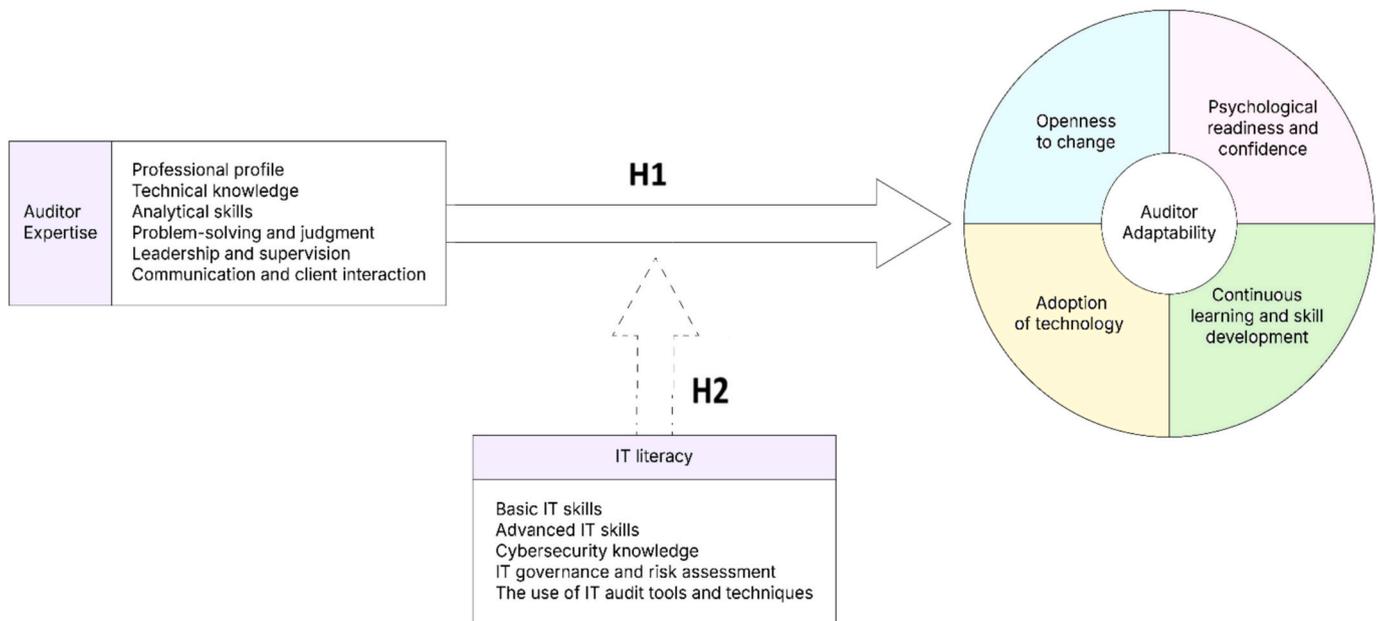


Fig. 1. Conceptual framework of the research. Source: Authors.

collection will be through a structured questionnaire distributed to external auditors operating in Lebanon both online and in paper format, depending on the respondents' preferences. This ensures broader accessibility and convenience (Fowler, 2014). According to the Lebanese Association of Certified Public Accountants (LACPA), there are approximately 1680 licensed external auditors operating in Lebanon. However, the number of active auditors, particularly those engaged in digital transformation efforts, may vary based on firm size, location, and industry specialization. Therefore, Cochran's modified formula for finite populations is used for calculating the sample size. This formula provides a sample size that accounts for the limited size of the population (Cochran, 1977). The formula is:

$$n_0 = \frac{Z^2 \cdot p \cdot (1 - p)}{e^2}$$

where

- n_0 = the sample size for an infinite population
- Z = Z-value (standard score) corresponding to the desired confidence level: 1.96 for 95 % confidence
- p = estimated proportion of the population (0.5 is used for maximum variability)
- e = margin of error: 0.05 for 5 % precision)

Then, the modified formula for **finite populations** becomes:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

where

- n = the final sample size for the finite population
- N = size of the population

Hence, 323 auditors would be statistically valid to ensure representative results.

The questionnaire will be designed based on a 5-point Likert scale statements to measure constructs such as auditor expertise, adaptability, IT literacy, technological self-efficacy, and adaptability. The Likert scale offers respondents a range of options (Strongly Disagree to Strongly

Agree), which is suitable for measuring attitudes and behaviors quantitatively (Krosnick, MacInnis, Ho, & Cho, 2018).

3.2. Measurement of variables

3.2.1. Auditor expertise: Independent variable

The independent variable (IV) is auditor expertise, operationalized through six distinct categories that reflect the core competencies required for effective auditing. These categories include technical knowledge (Bierstaker, Janvrin, & Lowe, 2014; Kennedy & Peecher, 1997; Tan & Libby, 1997), analytical skills (Li, Dai, Gershberg, & Vasarhelyi, 2018; Uyar & Gungormus, 2011; Ham, et al., 2023), problem-solving and judgment (Trotman, Kang, & Trotman, 2015; Hamdam, Jusoh, Yahya, Abdul Jalil, & Zainal Abidin, 2022), leadership and supervision (Gissel & Johnstone, 2017), and communication and client interaction. Each category is assessed individually, then the total score for auditor expertise is calculated. This scoring system provides a comprehensive measure of expertise across the diverse dimensions of auditing. Auditor expertise is calculated by summing the scores from the six categories. Each category is assigned a specific point value, with the total points available summing to 100. The formula for auditor expertise is represented as:

$$\text{Weighted Average} = \sum_{i=1}^n w_i \cdot x_i = (0.5 x_1) + \sum_{i=2}^6 (0.1 x_i)$$

where

- x_i is the score for category i ,
- w_i is the weight assigned to category i , where $w_1 = 0.5$ and $w_2 = w_3 = w_4 = w_5 = w_6 = 0.1$
- n is the total number of categories (in this case, $n = 6$).

To facilitate the analysis and interpretation of auditor expertise, the obtained continuous scores must be transformed into categorical variables using quartiles. Quartiles divide the expertise scores into four groups, creating categories that range from novice to expert levels of expertise. This quartile-based approach is commonly used in statistical analysis to categorize continuous data, allowing researchers to group observations based on their relative positions within the dataset

(Altman, 1991). Quartiles are particularly useful when dealing with variables like auditor expertise, where the distribution of scores may vary across individuals (Altman, 1991; Everitt, 1998).

Quartile-based grouping captures the natural variation in auditor expertise across the dataset. This is particularly important in ANOVA designs, which benefit from balanced group sizes and homogeneity of variance. Quartile classification ensures that the divisions between groups are meaningful within the context of the current sample, thereby improving both the internal validity of the findings and their interpretability (Field, 2013). It enables the study to explore interaction effects between expertise and IT literacy in a way that predefined cutoffs alone might not allow.

By dividing the total expertise score into four quartiles, we established categories that allow for a comparison between auditors with different levels of expertise. These categories include:

- Q1: Novice Expertise (25th percentile)
- Q2: Intermediate Expertise (50th percentile)
- Q3: Advanced Expertise (75th percentile)
- Q4: Expert Expertise (100th percentile)

The quartile approach simplifies the complexity of continuous variables, facilitating clearer analysis and interpretation (Altman, 1991; Streiner, 2002). It enables differentiation between auditors at varying levels of expertise while maintaining the integrity of the underlying data (MacCallum, Zhang, Preacher, & Rucker, 2002).

The following table resumes the auditor’s expertise items highlighted in this study (Table 1).

3.2.2. IT literacy: Moderator variable

IT literacy is a critical competency for auditors operating in increasingly digital audit environments. The key components of IT literacy include basic IT skills, advanced IT skills, cybersecurity knowledge, IT governance and risk assessment, and the use of IT audit tools and techniques. Basic IT skills, such as proficiency in Microsoft Office and email systems, are foundational for auditors to manage digital documentation and communication effectively (Alles & Gray, 2024; Curtis & Payne, 2008). More advanced IT skills, including the use of ERP systems (e.g., SAP, Oracle) and data analytics tools (e.g., ACL, IDEA), are necessary for handling complex auditing tasks and analyzing large datasets (Alles & Gray, 2020; Appelbaum et al., 2021a, 2021b). With the increasing prevalence of cyber threats, auditors must also possess

cybersecurity knowledge to identify risks and protect sensitive client information (Cirne et al., 2022; Perols & Murthy, 2021; Ba, Martinov-Bennie, & Canestrari-Soh, 2020). Lastly, auditors must be proficient in using specialized IT audit tools, including AI-based and automated auditing software, to improve audit efficiency and effectiveness in the digital age (Abdullah & Almaqtari, 2024; Iwuanyanwu, Apeh, Adaramodu, Okeleke, & Fakeyede, 2023). These components ensure that auditors are well-equipped to navigate the challenges and opportunities presented by digital transformation.

To categorize IT literacy levels among auditors, tertiles were applied to transform IT literacy into a ranked categorical variable. Tertiles divide the scores into three groups, creating categories ranging from low to high levels of IT literacy. This approach is commonly used in statistical analysis to simplify continuous data, enabling researchers to categorize observations based on their relative positions within the dataset (Altman & Bland, 1994). Tertiles are particularly useful when dealing with variables like IT literacy, where the distribution of scores may vary among individuals (Altman & Bland, 1994). This method allows for the preservation of the reliability of the predefined scoring system while adding a data-driven layer that captures the relative positioning of respondents within the overall sample. Instead of relying on fixed benchmarks or cutoffs that may not reflect the characteristics of the current population, tertile categorization ensures that group boundaries are determined by the actual distribution of scores (Altman & Bland, 1994). This helps prevent distortions in analysis that can result from uneven or skewed score distributions. The formula for determining the cut-off points for tertiles is: (Kendall & Stuart, 1977):

$$T_k = L + \left(\frac{k*(N + 1)}{3} - c_f \right) \times \frac{w}{f}$$

where

- T_k : The k^{th} tertile value.
- L : The lower boundary of the interval containing the tertile.
- N : The total number of observations.
- c_x : The cumulative frequency up to the lower boundary of the interval containing the tertile.
- w : The width of the interval contains the tertile.
- f : The frequency of the interval containing the tertile.

By dividing the total IT literacy score into three tertiles, we established categories that allow for a comparison between individuals with

Table 1
Construct items for auditor expertise.

Component	Description	Measurement	Weights	Literature Backup
Professional profile	<ul style="list-style-type: none"> • Educational Qualification • Years of Experience • Professional Certifications • Type of Audit Firm • Industry Specialization • Experience with International Clients • Job Title • Area of expertise 	scales ranging from 1-to-4 and 1-to-6	50 %	Kartini, Pontoh, and Yolanda (2021); Beck and Wu (2006); Chen, Yang, and Yang (2020); DeAngelo (1981); Gaver and Utke (2018); Pais and Machado (2021); Francis (2004); Trotman et al. (2015)
Technical Knowledge	Familiarity with auditing standards (ISA, IFRS/GAAP) and the ability to identify discrepancies in financial statements.	Scale of 1 to 5 (SD-SA)	10 %	ISA, IFRS; Professional Standards (AICPA, ACCA, IFAC); Lyubenko, Znak, & Karpachova, 2022; Vrentzou, 2011
Analytical Skills	Ability to analyze financial data, perform ratio analysis, and detect potential fraud indicators or inconsistencies.	Scale of 1 to 5 (SD-SA)	10 %	Ratio analysis and fraud detection models (COSO, ACFE); Fadilah, Maemunah, Nurrahmawati, Lim, & Sundary, 2019; Kaminski, Wetzel, & Guan, 2004
Problem-Solving and Judgment	Ability to identify discrepancies, develop solutions, and exercise professional skepticism.	Scale of 1 to 5 (SD-SA)	10 %	Professional skepticism and judgment (ISA 200, ISA 500); Quadackers, Groot, & Wright, 2014; Trotman et al., 2015; Holovach & Holovach, 2022; Xu, Yang, & Fukufuka, 2023
Leadership and Supervision	Ability to lead audit teams, set goals, and resolve conflicts.	Scale of 1 to 5 (SD-SA)	10 %	Leadership in audits (AICPA frameworks, ACCA); Pratt & Jiambalvo, 1981; Pratt & Jiambalvo, 1982; Kush, 2009.
Communication and Client Interaction	Proficiency in explaining audit findings and interacting with clients.	Scale of 1 to 5 (SD-SA)	10 %	Effective communication in audits (IFAC, ACFE); (Golen, Catanach, & Moeckel, 1997; Smith, 2005; Hawkins, 2021; Handoko & Widuri, 2016)

different levels of IT literacy. These categories include:

- T1: Low IT Literacy (below the 33rd percentile)
- T2: Medium IT Literacy (33rd to 66th percentile)
- T3: High IT Literacy (above the 66th percentile)

This categorization helps simplify the interpretation of IT literacy levels and makes it easier to compare individuals across different levels of expertise.

3.2.3. Adaptability of auditor: dependent variable

Adaptability, the dependent variable (DV) in this study, is defined as the auditor’s ability to adjust to the demands of the digital era. This concept of adaptability has been operationalized across four key dimensions: openness to change (Kroon, do Céu Alves, & Martins, 2021), continuous learning and skill development (Gu, Schreyer, Moffitt, & Vasarhelyi, 2024; Lohapan, 2021), psychological readiness and confidence (Susanto, Pramono, Akbar, & Suwarno, 2023) and adoption of technology (Castka, Searcy, & Fischer, 2020; Rosli, Yeow, & Siew, 2012). These dimensions capture the essential characteristics required for auditors to successfully transition into and function within increasingly digital and technology-driven environments.

The adaptability score is calculated using the following formula, which aggregates the four dimensions and computes an average score:

$$\text{Adaptability Score} = \frac{D_1 + D_2 + D_3 + D_4}{4}$$

where

- D_1 = Score for Openness to Change (e.g., measuring flexibility and receptivity to new methods)
- D_2 = Score for Continuous Learning and Skill Development (e.g., commitment to ongoing education and skill acquisition)
- D_3 = Score for Psychological Readiness and Confidence (e.g., resilience, self-assurance in digital transitions)
- D_4 = Score for Adoption of Technology (e.g., willingness to engage with new technologies)

The adaptability formula is implemented after collecting perceptions of auditors using a Likert scale throughout 18 statements distributed across four categories. The Likert scale ranges from 1 (strongly disagree) to 5 (strongly agree). For each auditor, the mean score for each of the four dimensions is calculated, and the overall adaptability score is derived by averaging these dimensions. This mean score approach ensures equal weighting of each dimension, which is critical for accurately measuring adaptability, as it is a multifaceted construct that encompasses cognitive, emotional, and behavioral aspects of an auditor’s capacity to function effectively in the digital era (Ilori, Nwosu, & Naiho, 2024). Using a composite score that integrates multiple factors allows for a comprehensive evaluation of adaptability, capturing the auditor’s readiness and capacity to embrace change and new technologies (Andrade, 2021; Ismail, Mokhtar, & Ahmad, 2024). Higher scores indicate greater adaptability, allowing for an intuitive interpretation of results, where no single factor disproportionately influences the final score (Lai & Gul, 2021; Azizi et al., 2024). This method provides a balanced, holistic assessment, ensuring that each dimension contributes equally, thereby avoiding dominance by any one category, which is crucial in complex professional environments like auditing.

3.3. Validity and reliability assessment

The validity and reliability of the constructs was assessed using Cronbach’s alpha scores for auditor adaptability, IT literacy, and auditor expertise. Cronbach’s alpha scores obtained indicate strong internal consistency across constructs as shown in Table 2. As outlined by

Table 2
Reliability Test and Cronbach’s Alpha (α).

	Cronbach’s alpha	Numbers of items
Auditor Adaptability	0.872	18
IT literacy	0.816	15
Auditor Expertise	0.885	42

Source: SPSS Report.

existent literature, the ideal reliability range is from 0.7 to 0.95, affirming that the constructs in this study are reliably measured (Hair et al., 2019; Kline, 2023; Nunnally & Bernstein, 1994).

Moreover, to ensure the accuracy and reliability of our measurement tools, we conducted a pilot study following established guidelines (Van Teijlingen & Hundley, 2002). Pilot testing was crucial for validating the scoring system and ensuring that each category of auditor expertise was adequately represented and measured. This process helped confirm that the categories reflect theoretical constructs of auditing competence and that the scores generated are consistent and reliable (Cohen, Cohen, West, & Aiken, 2013; Nunnally & Bernstein, 1994). During the pilot test, we collected data from a sample of auditors to evaluate the performance of the scoring system. Feedback and statistical analyses from the pilot phase allowed us to refine our measurement tools and ensure the internal consistency of the categories.

3.4. Data analysis methods

In traditional statistical analysis, regression models are commonly employed to examine moderating effects by introducing an interaction term $\beta(M*V)$, where M represents the moderator and V the predictor variable. The moderating variable is integrated into the model to assess how it influences the relationship between the predictor (independent variable) and the outcome (dependent variable) via the interaction term, reflected in the beta coefficient β (Aiken & West, 1991; Hayes, 2018). Although effective in many cases, regression models may not always be suitable for analyses involving specific categorical or ordinal data structures, as they can impose limitations in studies with multiple categorical predictors (Hayes, 2018; Preacher, Rucker, & Hayes, 2007).

Structural Equation Modeling (SEM) presents a robust alternative by allowing for the simultaneous estimation of direct and indirect effects while accounting for measurement error. Unlike traditional regression models, SEM can integrate latent variables, making it particularly valuable when working with constructs measured through multiple indicators. Additionally, SEM enables the testing of moderation and mediation effects within a comprehensive framework, providing greater flexibility in modeling complex relationships (Byrne, 2016; Kline, 2015). However, given the specific purpose of this study—primarily focusing on identifying differences among groups rather than exploring complex relationships—the use of Two-Way ANOVA is justified. This method allows for direct comparisons of group means, providing clear insights into how adaptability varies across different levels of expertise and IT literacy. Additionally, Two-Way ANOVA enables post hoc analysis, which is critical for pinpointing which groups differ significantly from one another. The interpretability of the results, as illustrated in Table 7, further supports this choice, as ANOVA findings are more intuitive and accessible for comparative analysis than those obtained through SEM. Therefore, while SEM offers valuable advantages in modeling intricate relationships, Two-Way ANOVA is the preferred method in this study due to its alignment with the research objective of detecting and interpreting group differences effectively.

Consequently, a two-way ANOVA (Analysis of Variance) was applied to examine the intensity of adaptability across different levels of expertise and the potential for enhancing adaptability across varying combinations of expertise and IT literacy levels. Two-way ANOVA provides a robust framework to detect significant differences in adaptability across various levels of expertise and IT literacy, making it

particularly suitable for studies where predictor variables are categorical. To perform this analysis, continuous variables such as expertise and IT literacy were transformed into categorical ones, divided into distinct levels based on statistical quartiles and tertiles, to facilitate a more meaningful comparison across groups. Two-way ANOVA is particularly advantageous when examining interactions between categorical variables, as it allows for a clear understanding of how combinations of independent variable levels influence a dependent variable (Field, 2013; Pyrczak, 2016). This model can be represented by the following equation:

$$Y = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}$$

- Y represents the dependent variable: Auditor Adaptability
- μ is the overall mean of the dependent variable.
- α_i is the effect of the i^{th} level of auditor expertise.
- β_j is the effect of the j^{th} level of IT literacy.
- $(\alpha\beta)_{ij}$ is the interaction effect between auditor expertise and IT literacy.
- ϵ_{ijk} is the random error term for the k^{th} observation in the group.

To validate the normality assumption for the dependent variable, adaptability, Shapiro-Wilk and Kolmogorov-Smirnov tests were performed. The Shapiro-Wilk test is represented by the following formula: (Shapiro & Wilk, 1965).

$$W = \frac{\left(\sum_{t=1}^n a_t y_t\right)^2}{\sum_{t=1}^n (y_t - \bar{y})^2}$$

where

- W is the Shapiro-Wilk coefficient,
- a_t are constant coefficients derived from the covariance matrix of order statistics,
- y_t represents the ordered sample values, and
- n is the number of observations

The Kolmogorov-Smirnov test was additionally applied to ensure robustness in assessing normality across larger sample sizes. This test evaluates the maximum distance between the empirical distribution function of the sample and the cumulative distribution function of the reference normal distribution, providing a comprehensive assessment of the data's conformity to normality (Massey Jr., 1951). To further assess the normality visually, a Q-Q (Quantile-Quantile) plot was generated, allowing for the inspection of the distribution of adaptability data against a normal distribution line. Consistency of points along the line in the Q-Q plot supported the assumption of normality.

3.5. Homogeneity of variances

The assumption of homogeneity of variances was assessed using Levene's test, which tests the equality of variances across different groups by examining the F-statistic of sample variance. Levene's test formula is as follows:

$$F = \frac{\sum_{i=1}^g n_i (Z_i - Z_{..})^2}{(g - 1) \sum_{i=1}^g \sum_{j=1}^{n_i} (Z_{ij} - Z_i)^2}$$

where

- g represents the number of groups,
- n_i is the number of observations within each group,

- Z_{ij} represents the absolute deviation from the group mean for each observation, and
- $Z_i, Z_{..}$ are the means of absolute deviations within each group and across all groups, respectively (Levene, 1960).

Moreover, for detailed pairwise comparisons between levels of expertise and IT literacy, post hoc tests were conducted following significant findings in ANOVA. Tukey's Honestly Significant Difference (HSD) test was employed for post hoc analysis, allowing for further investigation of which specific pairs of groups differed significantly in terms of adaptability (Tukey, 1949). This method minimizes the Type I error rate associated with multiple comparisons, ensuring reliable insights into group differences.

4. Results and discussion

4.1. Descriptive statistics

In this subsection, we outline the characteristics of the auditors who constitute our sample, as the questionnaire targets external auditors across various profiles without imposing specific selection criteria (Table 3).

The sample comprises highly educated and experienced external auditors from diverse roles and firm types.

Table 3
Descriptive statistics of the characteristics of external auditors.

Demographic Variable	Category	Frequency	Percent (%)	
Gender	Male	201	62.2	
	Female	122	37.8	
	Total	323	100	
Age	20–35 years	84	26	
	36–45 years	105	32.5	
	46–55 years	82	25.4	
	>55 years	52	16.1	
	Total	323	100	
Education	Bachelor's degree	126	39	
	Master's or MBA	173	53.5	
	PhD or DBA	24	7.5	
	Total	323	100	
Experience	0–5 years	36	11.1	
	6–10 years	69	21.4	
	11–15 years	73	22.6	
	16–20 years	61	18.9	
	>20 years	84	26	
Total	323	100		
Certification	LACPA	323	–	
	US CPA	55	–	
	CMA	14	–	
	DIP IFRS	12	–	
	CIA	14	–	
	CFA	18	–	
	CA	46	–	
	Total^{a*}	482	–	
	Firm	Big 4	118	36.5
		Mid-Tier Firm	87	27
Small Firm		54	16.7	
Independent		64	19.8	
Total	323	100		
Role	Junior Auditor	62	19.2	
	Senior Auditor	93	28.8	
	Audit Manager	104	32.2	
	Audit Partner	58	18	
	Other	6	1.8	
	Total	323	100	
International Clients	No	277	85.8	
	Yes	46	14.2	
Total	267	100		

In Certification section, Total^{a*} represents the total number of certifications among the population

Source: Data Collected by Authors.

4.2. Analysis of variance

The assumption of normality for the dependent variable, *Auditor Adaptability*, was tested using both the Shapiro-Wilk and Kolmogorov-Smirnov tests. The results indicated that the normality are shown in Table 4 below:

Since the *p*-values for both tests were greater than the 0.05 threshold, it can be concluded that the residuals for the adaptability variable do not significantly deviate from normality, and the data are appropriate for use in the two-way ANOVA (Pyrzczak, 2016). The normality assumption for the dependent variable, *Auditor Adaptability*, was further assessed through a Quantile-Quantile plot (Q-Q plot). Visual inspection of the Q-Q plot showed that the data points aligned closely with the diagonal reference line, indicating that the residuals are approximately normally distributed. Only minor deviations from the line were observed at the tails, which are not considered significant. Thus, the Q-Q plot suggests that the normality assumption for adaptability is adequately satisfied, supporting the use of a two-way ANOVA for the analysis (Fig. 3).

In the same context, the test for heteroscedasticity was conducted to examine whether the variance of residuals is constant across all levels of the predicted values. For this reason, a “Residuals vs. Predicted Values” scatterplot was generated to visually inspect for heteroscedasticity in the adaptability variable. If the residuals are randomly scattered without forming any clear pattern, it indicates that the assumption of homoscedasticity (equal variance) holds. In contrast, patterns such as funnel shapes would suggest heteroscedasticity, where variance increases or decreases at different levels of the predicted values (Fig. 2).

Upon examining the scatterplot, the residuals appear to be randomly distributed around zero, with no clear patterns or funnel-shaped formations. This indicates that the residuals have relatively constant variance across all predicted values. Therefore, it was concluded that the assumption of homoscedasticity is satisfied for the adaptability variable, and there is no evidence of heteroscedasticity in the data. This ensures that the model meets the necessary assumption of equal variances for valid ANOVA results.

The below table presents the results from the Tests of Between-Subjects Effects for the dependent variable “Adaptability”. This analysis evaluates the main effects of “Auditor Expertise”, “IT Literacy”, and their interaction on adaptability in the digital era. The corrected model represents the overall fit of the model, including both main effects and the interaction term, while the error term accounts for unexplained variance in the data Table 5.

These results reveal that the adaptability of auditors is significantly influenced by their expertise. More experienced auditors demonstrate higher levels of adaptability, suggesting that auditor expertise has a meaningful impact on how well individuals adjust to changes in the digital environment. This result is statistically significant and highlights the crucial role of expertise in an auditor’s ability to adapt. These findings align with the dynamic capabilities’ framework (Teece et al., 2007), and suggest that expertise enhances the ability to adapt to technological changes by leveraging existing resources. This supports prior research (e.g., Manita et al., 2020; Sirois et al., 2018), which highlights the role of expertise in improving adaptability and performance in technology-driven audit environments.

Interestingly, IT literacy alone does not show a direct significant effect on adaptability in this model. This suggests that simply having higher IT literacy may not be enough to drive adaptability independently. However, the interaction between IT literacy and auditor expertise is significant, indicating that the relationship between

Table 4
Shapiro-Wilk and Kolmogorov-Smirnov results.

	T-statistic	P-value
Shapiro-Wilk	0.982	0.152
Kolmogorov-Smirnov	0.068	0.213

expertise and adaptability is moderated by IT literacy. In other words, the adaptability of auditors is enhanced when their IT literacy is also high, and the effect of expertise on adaptability is stronger in individuals who possess higher IT literacy.

This interaction effect suggests that while expertise is a key determinant of adaptability, its full impact is realized when auditors are also proficient in IT skills. Auditors with lower IT literacy may not benefit as much from their expertise in terms of adaptability. Therefore, IT literacy acts as a crucial moderator, amplifying the effect of expertise on adaptability in the context of the digital era.

The model explains a meaningful portion of the variance in adaptability, underscoring the combined importance of auditor expertise and IT literacy in shaping auditors’ ability to adapt to digital tools and processes. These findings emphasize the need for organizations to not only foster auditor expertise but also focus on enhancing IT literacy to maximize adaptability in the workforce.

Moreover, the Tukey HSD test was applied to further explore the differences in adaptability across various levels of auditor expertise, specifically comparing novice, intermediate, advanced, and expert auditors. By conducting this test, we can determine which pairs of expertise levels show statistically significant differences in adaptability, providing a more detailed understanding of how auditor expertise influences their adaptability in the digital era (Table 6).

This table reflects the relative trends between Advanced auditors and both Novice and Intermediate levels, indicating that Advanced auditors are trending toward higher adaptability, though the most significant differences are observed when comparing Experts.

Moreover, Tukey’s HSD comparisons were also used to explore pairwise differences between different levels of auditor expertise and IT literacy combinations. These tests help clarify which specific group combinations are driving the significant interaction. The results provide more detailed insights into how different levels of IT literacy and auditor expertise affect adaptability, offering practical interpretations for decision-makers regarding the role of IT skills in improving auditor adaptability in the digital era. The following table provides a focused view of the adaptability differences within each expertise level across different IT literacy levels (Table 7):

The post-hoc analysis of adaptability across different levels of expertise and IT literacy reveals several significant trends. For “novice auditors” with higher levels of IT literacy—particularly at the high IT literacy level—are significantly more adaptable compared to those with low or medium IT literacy. This suggests that for novice auditors, improving IT literacy can have a notable impact on their adaptability. The significant adaptability gains among novices with higher IT literacy echo findings by Appelbaum and Nehmer (2020), who argue that IT training provides foundational skills critical for auditors to navigate basic technological tools, enabling them to adapt more effectively to the demands of digital auditing environments. For intermediate auditors, the cognitive effort required to integrate additional IT skills may diminish, resulting in less pronounced improvements in adaptability. This indicates that high IT literacy is a key factor in improving adaptability for intermediate auditors, but improvements plateau at higher literacy levels. Additionally, advanced and experts’ auditors with medium and high IT literacy are significantly more adaptable than those with medium IT literacy, suggesting that, for advanced auditors, increased IT literacy has a continuous positive effect on adaptability. Similarly, previous studies have demonstrated that a high level of expertise increases access to categorical information for both intermediate and advanced experts (Johnson & Mervis, 1997; Goeke, Faley, Brandyberry, & Dow, 2018). Moreover, the continuous improvement in adaptability with increasing IT literacy for advanced and expert auditors highlights the relevance of the dynamic capability framework (Teece et al., 2007). Experts leverage their deep domain knowledge in conjunction with IT proficiency, allowing them to integrate advanced digital tools into complex auditing tasks effectively.

To further clarify and visually support the results presented in the

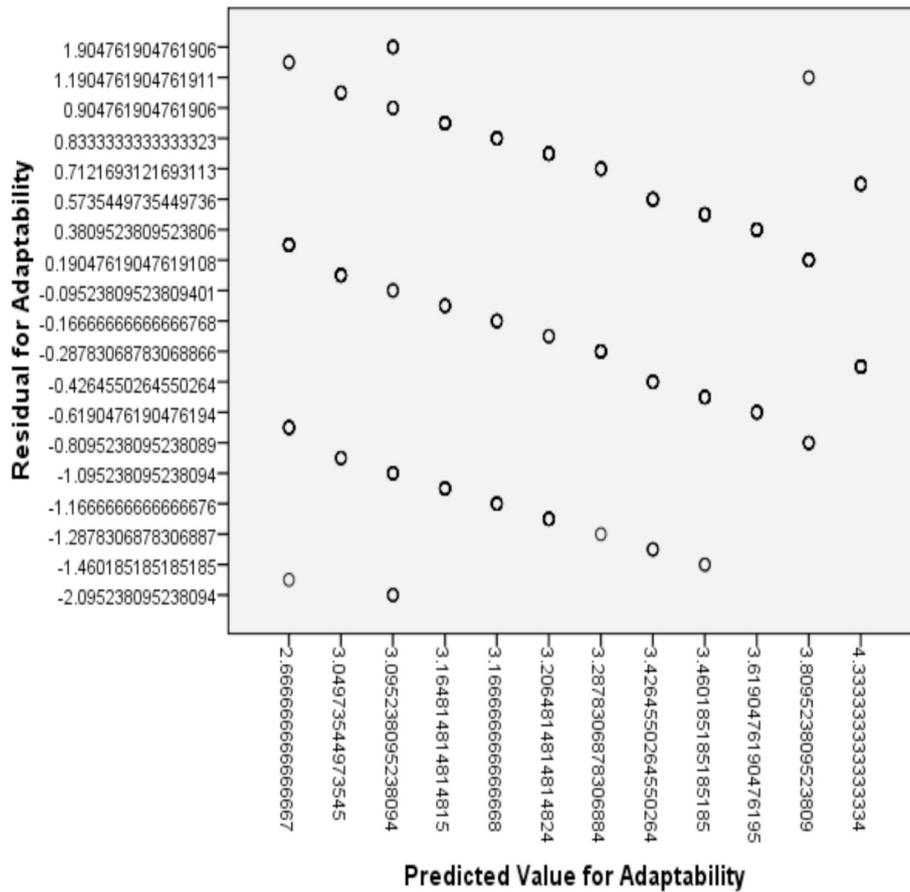


Fig. 2. “Residuals vs. Predicted Values” scatterplot. Source: SPSS Report.

Normal Q-Q Plot of Residual for Adaptability

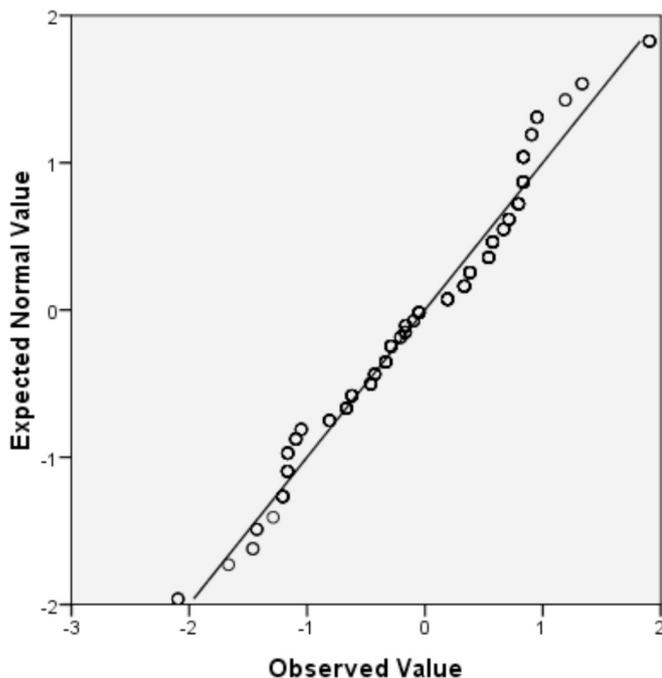


Fig. 3. Q-Q plot of residual for Adaptability Source: SPSS Report.

Table 5

Tests of Between-Subjects Effects for the dependent variable “Adaptability”.

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	43.3348	10	4.3335	6.8074
Intercept	2525.3263	1	2525.3263	3967.013
Interaction	19.5608	5	3.9122	6.1456
IT Literacy	0	0	–	–
Expertise	5.4796	1	5.4796	8.6079
Error	162.9648	256	0.6366	–
Total	3193	267	–	–
Corrected Total	206.2996	266	–	–

Source: SPSS Report.

previous table, the following figure illustrates the relationship between IT literacy and adaptability across different levels of auditor expertise. By presenting each expertise level in a separate subplot, the graph offers a clear and intuitive view of how adaptability evolves within each group as IT literacy increases. Flat lines indicate cases where differences in adaptability were not statistically significant, while upward slopes highlight where significant improvements were observed. This visual representation helps to contextualize and reinforce the statistical findings, making the patterns of interaction more accessible and easier to interpret (Fig. 4).

The graphs reveal that while adaptability increases modestly or remains stable at lower expertise levels, it rises more sharply for Advanced and Expert auditors, highlighting a stronger impact of IT literacy on those with higher professional experience. This suggests that digital competencies become increasingly valuable as expertise deepens.

Similar findings were highlighted in previous studies (Reddy, Sharma, & Chaudhary, 2020; Tinmaz, Lee, Fanea-Ivanovici, & Baber,

Table 6
Results for post-hoc analysis of adaptability across different levels of expertise.

Expertise Comparison	Mean Difference (I-J)	p-value	Significant?	Interpretation
Novice vs. Intermediate	-0.1202	0.808	No	No significant difference in adaptability between Novice and Intermediate. Advanced auditors have higher adaptability than Novices (trend, but not significant).
Novice vs. Advanced	-0.2679	0.212	Yes	Experts have significantly higher adaptability than Novices. Advanced auditors have higher adaptability than Intermediates (trend, but not significant).
Novice vs. Expert	-0.6488	< 0.001	Yes	Experts have significantly higher adaptability than Novices. Advanced auditors have higher adaptability than Intermediates.
Intermediate vs. Advanced	-0.1477	0.713	Yes	Experts have significantly higher adaptability than Intermediates.
Intermediate vs. Expert	-0.5286	0.001	Yes	Experts have significantly higher adaptability than Advanced auditors.
Advanced vs. Expert	-0.381	0.039	Yes	

Source: Author’s own work.

2022) which highlighted the key role of IT literacy for its future contribution. Consequently, this result aligns with the dynamic capabilities framework (Teece et al., 2007), which suggests that adaptability is enhanced by the ability to integrate and apply new competencies, such as IT literacy.

Overall, the results demonstrate a clear pattern: across all levels of

expertise, higher IT literacy is associated with increased adaptability. This relationship is particularly pronounced in the “expert” and “advanced” groups, where the highest levels of IT literacy led to the greatest adaptability, highlighting the critical role of IT literacy in enhancing adaptability, especially for more experienced auditors.

5. Conclusion

This study contributes novel insights into the adaptability of auditors in response to digital transformation, a topic that has been increasingly discussed but often limited to general skill development without examining the specific interplay of expertise and IT literacy. By analyzing adaptability across multiple dimensions—openness to change, continuous learning, psychological readiness, and technology adoption—this research expands our understanding of how auditors adapt within digitally evolving environments. Using a two-way ANOVA, this study provides one of the first detailed examinations of adaptability as a function of both expertise and IT literacy, revealing substantial interaction effects between these factors and highlighting their joint impact on auditor readiness for digitalization.

The findings align with the dynamic capabilities framework which emphasizes leveraging knowledge assets, such as IT proficiency, to enhance organizational and individual adaptability. Additionally, the results corroborate with this framework as novices exhibited significant adaptability gains through IT literacy, consistent with the cognitive stage of skill acquisition. At advanced levels, experts in the autonomous stage demonstrated further adaptability gains, supporting the notion that advanced IT skills facilitate more sophisticated problem-solving and decision-making processes. Furthermore, this study extends the dynamic capabilities framework by highlighting that perceived usefulness of IT tools, supported by higher IT literacy, significantly enhances auditors’ readiness for digital transformation.

The results demonstrate that higher levels of expertise and IT literacy correlate with significantly greater adaptability among auditors, with noticeable interaction effects. This underscores the necessity of balancing technical skill development with adaptability-focused

Table 7
Results for post-hoc analysis of adaptability across different levels of expertise and IT literacy.

Expertise Level	Compared With	Mean Difference (I-J)	p-value	Significant?	Interpretation
<i>Novice</i>					
Novice + Low IT Literacy	Novice + Medium IT Literacy	-0.6667	0.21	No	No significant difference in adaptability between Novices with Low and Medium IT Literacy.
Novice + Low IT Literacy	Novice + High IT Literacy	-0.4444	0.0353	Yes	Novices with High IT Literacy are significantly more adaptable than those with Low IT Literacy.
Novice + Medium IT Literacy	Novice + High IT Literacy	-0.2222	0.00882	Yes	Novices with High IT Literacy are significantly more adaptable than those with Medium IT Literacy.
<i>Intermediate</i>					
Intermediate + Low IT Literacy	Intermediate + Medium IT Literacy	-0.1333	0.993	No	No significant difference in adaptability between Intermediates with Low and Medium IT Literacy.
Intermediate + Low IT Literacy	Intermediate + High IT Literacy	-0.6905	0.019	Yes	Intermediates with High IT Literacy are significantly more adaptable than those with Low IT Literacy.
Intermediate + Medium IT Literacy	Intermediate + High IT Literacy	-0.246	0.039	No	No significant difference between Intermediates with Medium and High IT Literacy.
<i>Advanced</i>					
Advanced + Low IT Literacy	Advanced + Medium IT Literacy	-0.8667	0.001	Yes	Advanced auditors with Medium IT Literacy are significantly more adaptable than those with Low IT Literacy.
Advanced + Low IT Literacy	Advanced + High IT Literacy	-0.381	0.039	Yes	Advanced auditors with High IT Literacy are significantly more adaptable than those with Low IT Literacy.
Advanced + Medium IT Literacy	Advanced + High IT Literacy	-0.7143	0.037	Yes	Advanced auditors with High IT Literacy are significantly more adaptable than those with Medium IT Literacy.
<i>Expert</i>					
Expert + Low IT Literacy	Expert + Medium IT Literacy	-1.6667	< 0.001	Yes	Experts with Medium IT Literacy are significantly more adaptable than those with Low IT Literacy.
Expert + Low IT Literacy	Expert + High IT Literacy	-0.9524	0.002	Yes	Experts with High IT Literacy are significantly more adaptable than those with Low IT Literacy.
Expert + Medium IT Literacy	Expert + High IT Literacy	-0.7143	0.0077	Yes	Experts with High IT Literacy are significantly more adaptable than those with Medium IT Literacy.

Source: Generated by SPSS Report and restructured by Authors.

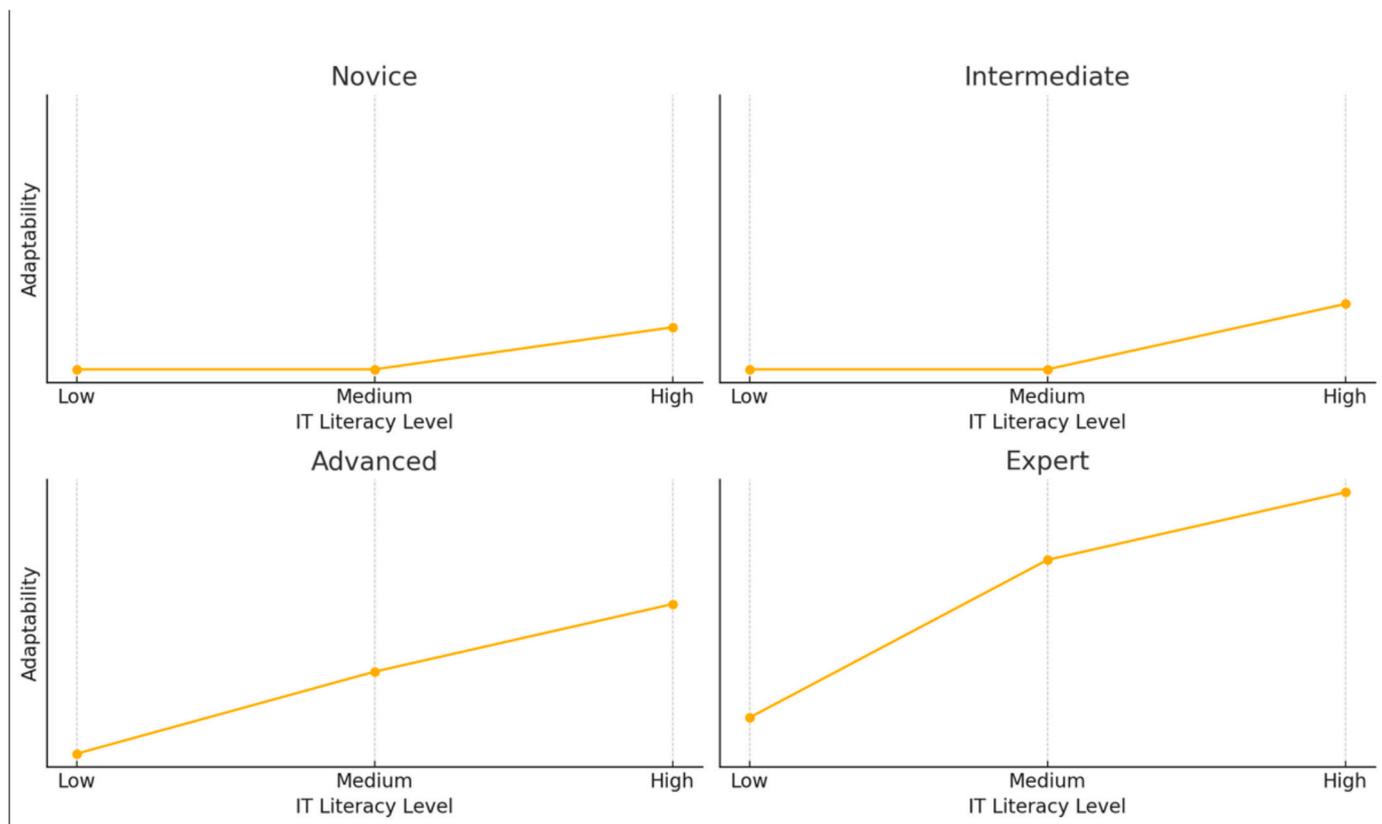


Fig. 4. Adaptability trends across IT literacy levels by auditor expertise. Source: Authors.

training to prepare auditors for technology-driven challenges. The findings are consistent with past research, such as [Susanto et al. \(2023\)](#) and [Ismail et al. \(2024\)](#), which emphasize the importance of psychological readiness in digital transitions. However, this study goes beyond traditional models by integrating adaptability across multiple dimensions, illustrating the critical role of openness to change and IT literacy enhancement.

The implications of this study for policy and practice are significant. Organizations and professional bodies should prioritize adaptability-focused training programs, emphasizing both technical skills and psychological readiness, as suggested by [Appelbaum and Nehmer \(2020\)](#) and [Alles and Gray \(2020\)](#). However, employees or leaders may resist changes that challenge existing norms or established routines even with well-designed training programs, which can hinder successful implementation and reduce the effectiveness of these initiatives. Moreover, regulatory bodies could establish guidelines for continuous professional education that align with the adaptability dimensions outlined here, ensuring that auditors remain equipped for ongoing technological changes. Managers are also encouraged to include adaptability as a key metric in personnel evaluations, particularly focusing on digital readiness and technological skills, to foster resilience and competitiveness in technology-driven environments. Nevertheless, overemphasizing it without addressing structural enablers—such as leadership support, access to digital tools, and organizational culture—could place unrealistic burdens on individual employees.

However, the study’s reliance on self-reported data and its limited sample diversity may restrict generalizability. Future studies could address these limitations by employing longitudinal designs and including additional variables, such as productivity and risk perception, to provide a more holistic view of adaptability in auditing. Extending this analysis to include organizational culture, leadership, and resource availability could provide a more nuanced understanding of adaptability

development. Furthermore, exploring adaptability dynamics across diverse cultural and organizational settings would enhance the generalizability of findings, as suggested by [Andrade, 2021](#)). Incorporating a broader sample and additional time frames could also enable a deeper examination of adaptability behaviors and their evolution over time.

This study expands existing research by providing a multidimensional framework for adaptability, emphasizing the critical interplay between expertise and IT literacy. By integrating insights from the dynamic capabilities’ framework, this research highlights the need for targeted, tiered training programs to foster adaptability in auditors. Future studies should explore the interaction of individual and organizational factors to further refine adaptability frameworks in the digital age. Addressing these aspects will ensure that auditors and organizations remain resilient and agile in an increasingly digital and complex professional landscape.

Based on the findings and real-world validation, organizations and professional bodies should implement tiered training programs that address different levels of expertise, with junior auditors focusing on foundational IT literacy and experienced auditors advancing their proficiency in data analytics and automation tools. Training initiatives should also emphasize psychological readiness and openness to change through adaptability-focused components, such as change management workshops and scenario-based learning, to build resilience in the face of technological evolution. Managers should incorporate adaptability metrics into performance evaluations, emphasizing digital readiness and problem-solving capabilities. Additionally, organizations should promote continuous learning by integrating technology adoption practices, such as case-based learning and practical projects, to reinforce skill development and adaptability. These recommendations align with the best practices highlighted by [Appelbaum and Nehmer \(2020\)](#) and [Alles and Gray \(2020\)](#), underscoring the need for adaptability-focused strategies to sustain organizational competitiveness.

This study has limitations as it relied on self-reported data, which may introduce response bias, and was conducted within a limited organizational and cultural context. Additionally, the research focused on a specific timeframe, which may not fully capture long-term adaptability trends as technology continues to evolve.

Future research could explore how various organizational factors, such as leadership, resources, and training programs, influence the development of adaptability among auditors. Moreover, exploring the long-term evolution of adaptability, perhaps through longitudinal designs, would provide a more dynamic view of how auditors adjust to ongoing technological advancements. We believe that this study establishes a solid foundation for future research on auditor adaptability, offering theoretical and practical insights into the integration of expertise and IT literacy in technology-driven work environments.

CRedit authorship contribution statement

Joelle Matta: Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Formal analysis, Conceptualization. **Elie Chamoun:** Validation, Supervision, Software, Methodology, Conceptualization, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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