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REMOTE AUDITING OF QUALITY MANAGEMENT SYSTEMS

This article explores the evolving landscape of remote auditing (RA) within Quality Management Systems (QMS), emphasizing its growing relevance in the context of global digital transformation, pandemic-related disruptions, and geopolitical instability. The author presents a comprehensive literature review supported by strategic analytical frameworks (PESTLE, NOISE), as well as author developed STAIN approach, to assess the feasibility, benefits, and challenges of implementing RA in various organizational settings. The research is based on the hypothesis that the implementation of RA within QMS can provide a level of effectiveness, reliability, and audit quality comparable to or exceeding traditional on-site audits, provided that appropriate technological infrastructure, auditor competence, and principles of security, transparency, and trust are ensured. The research highlights how RA, once considered a contingency measure, is now emerging as a viable and often preferable alternative to traditional on-site audits. It offers significant advantages such as cost reduction, increased flexibility, enhanced safety, and environmental sustainability. However, the transition to RA also introduces complex challenges, including legal ambiguities, data protection concerns, technological barriers, and the need for auditor competence in digital environments. By integrating insights from international standards and recent academic research, the article proposes a set of practical recommendations to improve RA quality. These include the adoption of advanced

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ДИСТАНЦІЙНИЙ АУДИТ СИСТЕМ УПРАВЛІННЯ ЯКІСТЮ

Досліджено еволюцію дистанційного аудиту у системах управління якістю з акцентом на його зростаючу актуальність у контексті глобальної цифрової трансформації, пандемічних обмежень та геополітичної нестабільності. Проведено ґрунтовний огляд наукової літератури, використовуючи стратегічні аналітичні інструменти (PESTLE, NOISE), а також розроблено підхід STAIN для оцінки доцільності, переваг і викликів впровадження дистанційного аудиту в різних організаційних умовах. Висунуто гіпотезу, що впровадження дистанційного аудиту систем управління якістю може забезпечити рівень результативності, надійності та якості аудиту, співставний або вищий порівняно з традиційними очними перевірками, за умови наявності відповідної технологічної інфраструктури, кваліфікації аудиторів та дотримання принципів безпеки, прозорості та довіри. Підкреслено, що дистанційний аудит, який раніше розглядався як тимчасовий захід, нині перетворюється на життєздатну та часто переважну альтернативу традиційному очному аудиту. Дистанційний аудит має суттєві переваги, зокрема зниження витрат, підвищення гнучкості, покращення безпеки та екологічну сталість. Водночас перехід до дистанційного аудиту супроводжується складними викликами, а саме: правова невизначеність, ризики захисту даних, технологічні бар'єри та необхідність високої цифрової компетентності аудиторів. На основі інтеграції положення міжнародних стандартів та сучасних наукових досліджень запропоновано практичні рекомендації для підвищення якості

technologies (AI, IoT, VR), the development of standardized procedures, and the enhancement of auditor training and ethics. The STAIN framework serves as a conceptual model for ensuring trustworthiness and effectiveness in RA practices. This work is particularly relevant for auditors, certification bodies, policymakers, and organizations seeking to modernize their compliance and quality assurance processes in line with digital transformation trends.

Keywords: Remote Audit (RA), Quality Management Systems (QMS), Standards, Audit quality, STAIN, auditor competence, compliance, auditors, auditees.

дистанційного аудиту. Серед них – впровадження передових технологій (AI, IoT, VR), розробка стандартизованих процедур та посилення професійної підготовки й етики аудиторів. Концептуальна модель STAIN слугує основою для забезпечення довіри та ефективності дистанційного аудиту. Дослідження є особливо актуальним для аудиторів, сертифікаційних органів, регуляторів та організацій, що прагнуть модернізувати процеси контролю та забезпечення якості відповідно до тенденцій цифрової трансформації.

Ключові слова: дистанційний аудит, системи управління якістю, стандарти, якість аудиту, *STAIN*, компетентність аудитора, відповідність, аудитори, аудитовані сторони.

JEL Classification: D21, K13, L15, L22, M11.

Introduction

The dynamism of today's market environment, combined with high levels of uncertainty, has intensified the search for universal principles and mechanisms that can address practical problems while ensuring organizational effectiveness. One such mechanism is the quality system audit (QSA), which reflects the broader transformations occurring under contemporary market conditions.

QSA is a mandatory component of quality management systems (QMS). It is defined as a systematic, independent, and documented process of collecting and evaluating objective evidence to determine the extent to which audit criteria are fulfilled (ISO 9000:2015, 2015). The methodological foundation for QSA is established by the International Organization for Standardization (ISO) standards – particularly ISO 19011:2018: Guidelines for auditing management systems– alongside relevant industry-specific regulations.

Traditionally, QSA has been carried out with the audit subject (i.e., the conformity assessment body) physically present at the organization's primary site of activity. This practice has been consistent across different ownership structures, economic sectors, and industries, with the primary criterion being the auditor's ability to objectively verify the QMS's functioning and the organization's compliance within the defined certification scope.

However, recent circumstances emphasize the need to expand beyond this traditional, on-site approach to include remote auditing (RA), enabled by modern information-communication technologies (ICT). This development is driven by two interrelated factors:

- safety and accessibility concerns (e. g., quarantine restrictions, geopolitical disruptions, or military conflicts) that limit the feasibility of physical audits;
- rapid advancements in communication tools (e. g., video conferencing, virtual presence technologies), which now make it possible to conduct audits effectively in a remote setting.

The RA study methodology of QMS is being undertaken by many scientists. RA is not the only right solution to all problems; this is also not a substitute for direct audits. However, as part of a long-term assurance program, RA can play a role in providing assurance when special circumstances do not allow normal business conduct (Yasmin et al., 2023). In times of crisis, the function of internal audit (in a remote format as well) is crucial in the process of risk management and control, because the auditor can provide relevant advice and assessments that correspond to the organizational structure of the observed entity (Kljajić et al., 2022). RA can increase the efficiency and effectiveness of the audit process, thereby increasing the auditor's ability to find and report violations (Ismanidar et al., 2022). The important determinant of RA realisation becomes the psychological component, which includes the mechanisms of interaction during the interview and study part (Synhaivska & Lisnichenko, 2023).

Specific research focused on analyzing changes to audit methods due to new technology. In the digital transformation era, auditing must adapt to integrating digital technologies that enhance efficiency, flexibility, and innovation within organizations (Liew et al., 2022; Leocadio et al., 2025). Sasai et al. (2024) proposed a new approach for the inspection of regenerative medicine manufacturing facilities and assessment for more cell culture processing facilities than the current in-person audit method. The author mentioned that RA offers a major advantage of avoiding external personnel entering spaces with limited or restricted access and that RA is considered to be advantageous for the periodic survey of facilities in operation. The perspective of the RA has also been considered in the case of medical device manufacturers and has proven to be highly effective in terms of both economic efficiency and the organisation of safe working conditions for all participants in the audit process (Mykhalko & Zenkina, 2021).

Under the possibility of implementing new technology in the audit process, Ariyanto (2024), mentioned that big data analytics enables auditors to perform more precise risk assessments by identifying patterns and anomalies in large datasets, that is why integrating big data and technology in auditing leads to more comprehensive, efficient, and effective audit processes, providing deeper insights and greater value to clients. Innovative adoption of AI technologies enables real-time data processing and pattern recognition, adding a predictive dimension to auditing.

Maharini et al. (2024) analysed the potential of Internet of Things (IoT) technology use during audits and determined that RA could improve flexibility by allowing better control over audit timing and interview scheduling. For RA to be successful, collaborative engagement with the auditee is crucial, as is the appropriate technological infrastructure and software/hardware to enable RA.

Interesting research was undertaken by Wilasittha (2022) regarding the implementation of RA methods in a post-pandemic environment, which emphasized that auditors must also have the ability and expertise to use technology so that RA can be carried out effectively and efficiently. Fadillah

and Pramudyastuti (2023) complemented research on the impact of COVID restrictions, highlighting that the implementation of this RA affects the completeness and reliability of audit evidence, so that both the auditor and the client are expected to be able to understand the use of technology in supporting the audit process being carried out. Auditors are required to conduct RA and use ICT more than in previous years (Zaferar et al., 2024).

With all due respect to the research analyzed, it must be acknowledged that there is a lack of completeness and an absence of a holistic perspective on the subject, which may lead to misunderstandings regarding the implementation of RA methods. The empirical findings and theoretical frameworks presented by the aforementioned authors will be utilized and adapted to align with the objectives of the current study.

This research aims to provide a comprehensive analysis of the potential advantages associated with the further implementation of RA methods within QMS. In addition, the paper seeks to outline a concise set of practical recommendations designed to facilitate the effective adoption and integration of this modern audit approach.

It is hypothesized that the implementation of RA within QMS can provide a level of effectiveness, reliability, and audit quality comparable to or exceeding traditional on-site audits, provided that appropriate technological infrastructure, auditor competence, and principles of security, transparency, and trust are ensured.

Methodological framework. The research method employed in this study is a literature review. This approach involves critically examining and analyzing ideas, concepts, and innovations presented in academically oriented literature to identify their theoretical and methodological contributions to the selected topic.

Due to the absence of verifiable global data on the distribution of remote, on-site, and hybrid audits within QMS, this research adopts a theoretical approach focused on analysing the potential benefits and weaknesses of RA. To achieve this aim, two strategic analytical frameworks were applied: PESTLE and NOISE. These methodologies were selected for their complementary nature: while PESTLE examines macro-environmental factors influencing remote audits, NOISE emphasizes actionable strategies for improvement and innovation.

PESTLE (Political, Economic, Social, Technological, Legal, Environmental) (Soares et al., 2023; Matovic, 2020) analysis is a well-established strategic tool for evaluating the external factors that affect a system or process. Its relevance in this study lies in understanding the external environment that enables or constrains remote auditing practices.

NOISE (Needs, Opportunities, Improvements, Strengths, Exceptions) (Yusoff, 2024) analysis complements PESTLE by focusing on forward-looking, solution-oriented insights that address current challenges and leverage future possibilities in RA.

In addition, the present research will employ a specific approach developed by the author, aimed at providing a more detailed analysis of the

topic and addressing aspects that require further justification for successful implementation. The STAIN approach – an acronym for Security/Safety, Transparency, Accountability (Credibility), Inclusiveness, and Neutrality – is a conceptual framework designed to enhance the reliability and effectiveness of organizational processes. It emphasizes protecting information and resources (Security), ensuring openness and traceability (Transparency), reinforcing trust and professional responsibility (Accountability/Credibility), engaging diverse stakeholders in an accessible and participatory way (Inclusiveness), and maintaining objectivity in decision-making (Neutrality). Together, these principles provide a comprehensive foundation for achieving trustworthy, fair, and high-quality outcomes in complex environments.

The structure of this research consists of two main elements: the RA conceptual framework, which includes clarification of key definitions and an analysis of RA drivers; and a detailed evaluation of RA methodology implementation, conducted through the application of PESTEL, NOISE, and the author's proposed methodology, STAIN.

1. Remote audit concept

It is necessary to initiate the present research with a clear definition of the key concepts. Similar terms for RA, which have also been used in other research on this topic, include digital audit, virtual audit, e-audit, and others. For standardization and to avoid potential misunderstandings, the term RA will be used consistently throughout the present research.

1.1. Definition clarification

RA is one of the audit approaches listed in ISO 19011:2018 (Silitonga & Hastuti, 2022; ISO 19011:2018, 2018). According to the ISO/IEC TS 17012:2024 (2024) RA method is the method used for conducting audit activities from any place other than the location of the auditee. RA is defined as the process by which auditors perform audit procedures from a location outside the auditee's premises with the help of digital tools (Lorentzon et al., 2024). This broad interpretation enables us to define any audit conducted away from the physical location of the audited entity as an RA. On the one hand, this approach simplifies the categorization of audits to some extent; on the other hand, it may give rise to certain legal nuances:

- data privacy and protection regulations – auditors accessing sensitive data remotely may inadvertently violate laws such as GDPR (Europe) or HIPAA (USA) if cross-border data transfer is involved;
- jurisdictional issues – if the audited entity operates in multiple countries, it may be unclear which legal system governs the audit process, or which compliance standards apply.

- electronic signature validity – legal recognition of digital approvals or signatures may vary by country, potentially affecting the validity of audit documentation.
- confidentiality agreements – RA may increase the risk of unauthorized access to confidential information, leading to potential breaches of contractual obligations;
- industry-specific regulations – certain sectors (e. g., pharmaceuticals, finance) may legally require on-site verification for critical processes, which cannot be fully replaced by RA.

From our perspective, a RA is a form of auditing conducted at a distance from the audit object, utilizing appropriate methods and tools for data verification while ensuring compliance with legal requirements and fulfillment of established audit criteria.

The primary difference between conventional audits and RAs is the absence of in-person, face-to-face interactions, which changes how things like walk-throughs, visual inspections, interviewing, and other audit procedures must be performed (Wiśniewska et al., 2022). This implies a fundamental shift in the psychology of auditing and necessitates appropriate preparation from both auditors and auditees. There is a significant difference between the audit process in the field and the RA. In addition to the minimal face-to-face interaction between the client and the auditor during a RA, it is necessary to analyze the audit as well as carefully prepare. Preparation in a RA is key to the success of the audit, including communication between the auditee and the auditor related to the audit implementation process, the technology used, how to send documents, audit focus, and audit completion commitments (Wilasittha, 2022).

1.2. The remote audit approach drivers

As noted earlier, two key factors have driven the intensification of RA: security/safety considerations and technological advancements. These dimensions not only shape the way audits are conducted but also determine the scope, reliability, and acceptance of remote methods in professional practice.

One of the main drivers behind the growing adoption of RA is the need to ensure security, both in terms of health and safety (H&S) as well as information protection. The COVID-19 pandemic highlighted the importance of reducing physical contact and limiting travel, which made on-site audits more challenging or, in some cases, impossible. RA offered a viable alternative that allowed organizations to maintain compliance and oversight without exposing auditors and auditees to unnecessary risks. One of the central challenges confronted by auditors amidst the pandemic is the transition to remote work environments. Auditing practices traditionally rely on physical interactions and on-site inspections, making RA a formidable task. Auditors have grappled with issues related to conducting audits remotely, including limitations in access to client facilities, difficulties in

coordinating audit teams, and challenges in maintaining effective communication channels. The transition to RA has necessitated auditors to develop new strategies and protocols to ensure the quality and reliability of audit procedures. From a theoretical perspective, the contingency theory offers insights into the adaptive responses of organizations to external disruptions (Kusuma, 2024).

Beyond physical safety, data security is a crucial element. RA often involves the exchange of sensitive documents, access to internal systems, and real-time video monitoring of processes. This raises concerns about confidentiality, data protection, and compliance with legal frameworks such as the General Data Protection Regulation (GDPR) in Europe or the Health Insurance Portability and Accountability Act (HIPAA) in the United States. Organizations must therefore establish secure communication channels, encrypted data transfers, and clearly defined access rights to mitigate risks.

Security concerns also extend beyond health crises and data protection. In regions affected by armed conflicts, terrorism, or political instability, on-site audits may pose significant risks to the safety of auditors. Travel restrictions, physical threats, and unstable environments can make traditional audits impractical or even impossible. In such contexts, RA becomes not only a practical solution but, in many cases, the only viable option to ensure organizational accountability and compliance.

In this sense, security considerations have not only motivated the adoption of RA but have also shaped its methodologies and technological requirements. Even with different types of restrictions, such as access to facilities and difficulty in physically inspecting processes, remote audits are an important initiative to ensure compliance of the systems under analysis (Barretto et al., 2022).

The second major factor contributing to the intensification of RA is the rapid development of digital technologies. RA is used when face-to-face methods are not possible, which refers to the use of ICT in gathering information, interviewing clients, and others (Ria, 2023). Over the last decade, innovations in cloud computing, high-speed internet, video conferencing platforms, and specialized audit management software have significantly improved the feasibility of conducting audits remotely. These tools enable real-time communication, document sharing, and process monitoring, which are essential for ensuring audit reliability and transparency.

RA, also known as virtual auditing, is a method of conducting an audit using modern technology to obtain audit evidence (Kljajić et al., 2022). Emerging technologies such as blockchain, artificial intelligence (AI), IoT, and virtual reality (VR) are also transforming audit practices. Blockchain can provide tamper-proof records of transactions, AI can assist in anomaly detection and data analysis, IoT devices can offer continuous monitoring of production processes, while VR technologies enable immersive remote inspections of facilities or production lines, creating a near on-site experience

for auditors. Such tools expand the scope of what can be reliably assessed without physical presence, significantly reducing the limitations traditionally associated with remote audits. IoT-based RA has emerged as a transformative technology in the audit field, their ability to enable real-time data collection and improve audit accuracy and timeliness is fulfilling the increasing demand for efficiency and effectiveness in regard to helping auditors analyze large volumes of data during remote audit (Maharani et al., 2024).

The advantages of digitizing audits are in real-time data retrieval, and also the inspection time can be faster because there is analysis and testing using technology. Nevertheless, the digitization of the audit requires the auditor to pay more attention to the validity of the information and data provided (Fadillah & Pramudyastuti, 2023).

In some cases, security concerns and digital transformation processes operate jointly, reinforcing one another. Businesses have been forced to work remotely and adopt digital technology due to the COVID-19 pandemic, whether they were willing or not. Although the audit process was already adapting due to the occurrence of emerging digital technologies, the transition to a remote, "virtual" audit has been dramatically accelerated by COVID-19 (Farcane et al., 2023). RA also appeared in the literature as an important advancement in auditing practices, distinguished by the synergy between technology and remote communication. This approach became particularly relevant during the COVID-19 pandemic, where technological resources such as video conferences, online collaboration tools, and specialized software were employed to conduct audits remotely, providing a flexible and efficient approach aligned with the needs of the digital era (Liew et al., 2022). Changes in the way auditors work due to the COVID-19 pandemic are triggering the acceleration of digital audit adoption (Yuniarta et al., 2024). The COVID-19 and post-COVID periods have created a fundamentally new reality for the implementation of business processes, accelerating the adaptation of the business environment to rapid and unavoidable changes. In this context, technological solutions have emerged as a direct response to market demand for effective mechanisms to conduct RA. The success of RA relies heavily on the state-of-the-art technology available today (Yuniarta et al., 2024).

2. Evaluation of the implementation of the remote audit approach

The RA rise has transformed traditional audit processes, leveraging technology to enhance efficiency and accessibility (Mbonigaba & Vanitha, 2019). In summary, technological development not only facilitates the transition to RA but also enhances its quality, scope, and effectiveness. Without these advancements, including cutting-edge applications such as VR, the large-scale RA implementation would not be possible. The detailed PESTLE RA Analysis of QMS is presented below in *Table 1*.

Table 1

PESTLE RA analysis of QMS

PESTLE category	Content
Political	Governments increasingly support the digitalization of oversight and compliance, which encourages wider adoption of RA methods. In politically unstable regions, RA reduces risks associated with travel and personal safety. Public sector audits (e.g., healthcare, public procurement) may face stricter rules that either limit or encourage remote modalities, depending on the regulatory culture
Economic	RA reduces costs by eliminating travel, accommodation, and logistical expenses. They allow organizations to allocate audit resources more efficiently, enabling more frequent or broader audit coverage. Economic downturns, such as during COVID-19, highlighted RA as a cost-saving alternative while still maintaining compliance. However, investments in secure digital infrastructure, staff training, and software licenses are required upfront
Social	The shift to remote work and digital collaboration has normalized virtual interactions, making RA more acceptable. Some resistance persists among employees and managers due to a lack of trust in remote methods or fear of reduced transparency. Social expectations of continuous quality, accountability, and compliance remain high, increasing pressure for RA to be as reliable as on-site ones
Technological	Advances in digital tools (video conferencing, document-sharing platforms, cloud-based QMS systems) enable practical RA execution. Emerging technologies such as AI, blockchain, IoT, and VR expand the depth and reliability of RA. Cybersecurity remains a major challenge, requiring encrypted communication and secure access controls
Legal	RA must comply with data protection and privacy regulations (e.g., GDPR, HIPAA). Legal recognition of digital signatures, electronic records, and remote verification differs across jurisdictions. Industry-specific requirements (e.g., pharmaceuticals, aviation, defense) may still mandate physical inspections in certain cases. International certification bodies (ISO, IAF) are gradually updating guidelines to formally include RA
Environmental	RA contributes to sustainability by reducing travel-related carbon emissions. Less reliance on printed documents supports paperless, environmentally friendly practices. Environmental risks such as natural disasters or pandemics further reinforce the need for resilient, remote-capable audit methods

Source: proposed by the author.

The next important aspect is ensuring the high quality of RA practice (Khorunzhak et al., 2018). Audit quality and ways to improve it have long been and remain a topic for discussion and debate in the professional environment of auditor practitioners and regulators, in scientific research by economists (Kuzyk et al., 2024). It can be stated that there are two components of quality in auditing:

- "technological", production quality of the audit, which consists in compliance by auditors with the requirements of ISO Standards, the Code of Professional Ethics, etc., when performing specific tasks;
- the final quality of the audit product – information provided by the auditor, which may be in the form of an audit report or other generalizing document, depending on the task performed (Silitonga & Hastuti, 2022; Fabiianska, 2017).

Use of big data analytics has a positive and significant effect on audit quality (Ariyanto, 2024). Technology has a positive and significant effect on the quality of audit reports, as far as IT use can improve audit quality. For instance, big data analytics allows auditors to conduct more precise risk assessments by detecting patterns and anomalies within large datasets. Simultaneously, automation tools simplify routine tasks such as data extraction and analysis, minimizing human error and saving time. This enables auditors to concentrate on complex, judgment-based activities. Predictive and prescriptive analytics offer insights beyond historical data, forecasting future trends, and recommending measures to mitigate potential risks. Data visualization tools enhance the communication of audit findings through intuitive formats such as charts and dashboards. Machine learning algorithms further increase the speed and accuracy of detecting fraudulent activities. Cloud computing provides secure, scalable storage solutions, fostering flexibility and collaboration among auditors. Overall, the integration of big data and advanced technologies in auditing results in more comprehensive, efficient, and effective processes, delivering deeper insights and greater value to the final customer.

RA provides auditors with a challenge because this is not usually done before, and still not common. Auditors who were previously accustomed to using conventional methods, such as determining samples using spreadsheets, analyzing evidence obtained directly from the field, and interacting directly with clients, must be able to adjust by understanding and utilizing technology. Therefore, auditor quality, such as professional skepticism and competence in using information technology, is important in achieving high-quality performance of RA of QMS (Zaferar et al., 2024). With a new way of working like this, there must be an adaptation for the auditor, because regardless of how the audit is conducted, whether it is a RA or an onsite audit, the auditor is still required to be able to provide good results (Ria, 2023). Professional skepticism is an attitude in which the auditor should not assume that management is dishonest, but the possibility of their being dishonest must still be considered. Professional skepticism consists of two main components, namely a questioning mind and a critical assessment of audit evidence. The auditor will believe that the client has integrity and honesty, but a questioning mind will assist the auditor in overcoming his natural bias to trust the client. Auditors with high levels of information technology utilization, professional skepticism, auditor competence, and

auditor ethics as moderating variables will result in high remote audit quality (Silitonga & Hastuti, 2022). Audit quality must be improved by professionalism in order to avoid, detect, and report fraud. This, in turn, puts pressure on auditors to speed up their own adoption of technology and computerization of audits (Yuniarta et al., 2024).

Based on the research available on this topic, it can be concluded that audit quality is directly influenced by both the level of technological development and its availability, as well as by the competence of auditors – their skills and ability to effectively utilize these technologies, particularly when verifying the audit evidence base. This factor is critical in ensuring the RA reliability of QMS.

High-quality performance of RA in QMS could be achieved by complying with the following recommendations, which are presented below in the form of a NOISE analysis in *Table 2*.

Table 2

NOISE analysis of RA of QMS

NOISE category	Content
Needs	Clear international standards and guidelines for conducting remote audits. Reliable, user-friendly technological platforms that ensure security and transparency. Training for auditors and auditees to develop digital literacy and virtual communication skills
Opportunities	Expansion of RA across global supply chains, reducing geographical barriers. Integration of advanced technologies (AI, IoT, VR) to enhance audit effectiveness. Potential for hybrid models combining remote and on-site elements for optimal efficiency. Strengthening global collaboration and knowledge-sharing among certification bodies
Improvements	Establishing standardized procedures and protocols for RA execution. Enhancing cybersecurity frameworks to prevent data leaks or unauthorized access. Developing benchmarking tools to measure the effectiveness of remote versus on-site audits. Increasing stakeholder confidence through transparency and communication
Strengths	Cost-effective and time-efficient compared to traditional audits. Increased flexibility, enabling audits even in regions affected by crises (pandemics, wars, terrorism). Supports sustainability goals by reducing travel-related environmental impacts. Facilitates faster access to global expertise without geographical limitations
Exceptions	Certain processes still require physical verification (e.g., equipment calibration, product testing). Legal or industry-specific restrictions may limit the scope of RA. Technical disruptions (poor connectivity, software failures) can hinder audit reliability. Some organizations may resist adoption due to cultural or trust-related factors

Source: proposed by the author.

In general, even in the modern context of advanced IT development, RA methods continue to present significant challenges. These challenges arise from a combination of factors and inherent limitations.

From the existing challenges, a RA is carried out, which is supported by the use of IT, so that the external auditor can complete their work effectively and efficiently. The implementation of RA affects the completeness and reliability of audit evidence so that both the auditor and the client are expected to be able to understand the use of technology in supporting the audit process being carried out (Fadillah & Pramudyastuti, 2023). The rise of RA, however, introduces unique challenges alongside its numerous benefits. It necessitates a reassessment of traditional audit methodologies to maintain quality, data security, and compliance standards in a digital environment. RA practices also call for specialized skills in handling digital audit tools and managing online communication with clients. These changes offer new opportunities for auditors to improve flexibility, productivity, and client reach, but require rigorous planning, adaptation, and understanding of best practices to address potential challenges effectively (Mbonigaba & Vanitha, 2019). Some of the barriers appear due to the new remote working environment. In the context of teleworking, a significant drawback that auditors may face is the lack of information flow. A worker in a home office does not have all the information on operations, and, as a result, they may not perceive the information accurately or fully; therefore, the auditor may not have an adequate opportunity to test their understanding (Farcane et al., 2023).

The use of remote techniques in the certification process of QMS compliant with the requirements of ISO Standards is difficult, e.g., in the case of such areas as assessment of customer location and location-specific conditions, assessment of leadership requirements, or assessment of the implementation of the main processes in the organization (Nowicki & Kafel, 2021). Limitations in the RA process include direct observation, which cannot replace the direct viewing process. On the other hand, the implications of this research for auditors can be used to see opportunities for the audit profession in the future by developing their knowledge related to IT in order to be able to survive and compete in the digital era (Yasmin et al., 2023). Another important issue is the transfer of knowledge. Learning from senior auditors is crucial for the development of junior auditors, as most audit skills are acquired on the job. However, RA limits the exposure of junior auditors to complex audit situations, reduces personal interaction, and hampers collaboration. Onboarding new employees also becomes more challenging in a remote setup (Lorentzon et al., 2024).

Based on the analyzed literature, we have developed an additional set of recommendations for the successful realization of RA of QMS, referred to as the STAIN approach, which is presented below in *Table 3*.

Table 3

STAIN framework for successful RA of QMS realization

STAIN principle	Purpose	Key implementation actions
Security	Data protection access control crisis preparedness physical security integration	Implement robust cybersecurity measures, including encrypted communication channels, secure cloud storage, and multi-factor authentication for all audit participants. Define clear access levels to sensitive data, ensuring only authorized personnel can view or manipulate audit evidence. Plan for contingencies related to pandemics, geopolitical risks, or cyber-attacks to ensure audits can continue safely without compromising information integrity. For hybrid audits, coordinate with on-site personnel to maintain security of physical records and assets while enabling remote verification
Transparency	Clear procedures documentation real-time monitoring communication	Establish standardized remote audit procedures and share them with all stakeholders in advance. Maintain comprehensive digital records of all audit activities, including evidence collection, communications, and findings. Use collaborative platforms that allow auditees and auditors to track progress, ensuring openness in the audit process. Provide regular updates and feedback throughout the audit to minimize misunderstandings and maintain trust
Accountability / Credibility	Auditor competence evidence verification independent oversight performance metrics	Ensure auditors are trained in both QMS standards and the effective use of remote technologies. Apply rigorous methods to verify the authenticity and reliability of digital audit evidence. Involve third-party verification or peer review where possible to reinforce credibility. Track key performance indicators (KPIs) such as audit completeness, error rates, and timeliness to ensure accountability
Inclusiveness	Stakeholder participation accessibility cultural awareness feedback mechanisms	Ensure all relevant stakeholders, including remote teams, are engaged in the audit process. Utilize technology platforms that are accessible to users with varying levels of digital literacy and from different geographic locations. Adapt communication styles and procedures to accommodate diverse cultural and organizational contexts. Encourage auditees to provide feedback on the audit process, helping to improve participation and overall effectiveness
Neutrality	Objectivity bias mitigation conflict of interest standardization	Maintain impartiality by adhering strictly to audit criteria, without influence from organizational hierarchies or external pressures. Train auditors to recognize and counteract unconscious bias in interpreting digital evidence or conducting interviews. Ensure auditors have no personal or financial interests that could compromise their judgment. Use standardized checklists and scoring methods to reduce subjective interpretation and enhance fairness

Source: proposed by the author.

It is admitted that RA methodology has their undoubtable advantages. RA offers advantages in this regard, as specialists can perform their tasks digitally, and they can be invited in for shorter periods at a reasonable cost. Auditors perceive themselves as more time-efficient while working remotely. They cited the elimination of travel time and the focused nature of virtual meetings as benefits (Lorentzon et al., 2024). Commonly mentioned advantages of RA are reflected in the following: time and money savings by using ICT, avoiding personal visits of remote areas, increasing the scope of audit, increased efficiency of the audit team, double-check of documents leading to more relevant evidence, increased use of ICT strengthening documentation and reporting, and the fact that logistics related to auditing are not needed anymore (Kljajić et al., 2022). The continuous integration of human and AI resources is not just a strategic advantage but an imperative necessity to consistently conduct RA at the forefront of the digital revolution (Liew et al., 2022). IT provides many conveniences in the audit process so that it can be conducted more effectively and efficiently (Zaferar et al., 2024). The innovative adoption of AI technologies allows real-time data processing and pattern learning, adding a predictive dimension to auditing. This raises important considerations around data integrity, privacy, and algorithmic fairness, prompting auditors to address the ethical implications and ensure transparency in these practices (Leocadio et al., 2025). The realization of RA, in the current context and in view of future opportunities, was considered very advantageous and a very interesting option (Barretto et al., 2022). The obvious benefit of RA is more efficient use of resources. RA techniques can save auditors' travel time and expenses while improving efficiency (Nowicki & Kafel, 2021).

The RA process has some advantages and disadvantages. However, the advantages are greater than the disadvantages, and, therefore, the organizations worldwide are embracing the RA as it is easier to maintain and less costly. It seems that RAs are the future of the auditing system, and their advantages are unquestionable. They are a far more efficient approach to the auditing process, and it is not only from the point of view of the company being audited but also from the point of view of the audit team as well. RA is gaining popularity in the auditing industry, and many businesses rely on it (Wiśniewska et al., 2022).

Conclusions

RA has emerged as a transformative approach to quality assurance, driven by the need for resilience, adaptability, and technological integration in a rapidly changing world. The traditional model of on-site audits is increasingly being complemented or replaced by remote methods that leverage digital tools to maintain oversight, ensure compliance, and uphold standards even in challenging circumstances.

The article demonstrates that RA is not merely a response to temporary disruptions but a strategic innovation that aligns with broader trends in digitalization and globalization. It offers clear benefits in terms of cost savings, operational efficiency, and environmental sustainability, while also enabling organizations to access global expertise and conduct audits across borders without logistical constraints.

The analysis demonstrates that RA can achieve a level of effectiveness and reliability comparable to traditional on-site audits when supported by appropriate technological tools, clear methodological guidance, and sufficient auditor competence. RA enhances efficiency, reduces operational costs, supports environmental sustainability, and expands access to global expertise.

At the same time, the hypothesis cannot be confirmed unconditionally. Certain QMS processes still require physical verification; legal and cybersecurity challenges persist; and variations in digital literacy and technological readiness may limit the applicability of RA. The completeness and reliability of RA evidence also depend significantly on the preparation of auditors and auditees.

Overall, the hypothesis is confirmed in its core assumption: RA is a viable and effective approach to QMS assessment. However, its success is contingent upon technological, regulatory, and organizational factors that must be addressed to ensure consistent audit quality.

Successful implementation of RA demands a rethinking of audit methodologies, the development of standardized procedures, and the cultivation of auditor competencies in digital environments. Ethical considerations, data protection, and legal compliance must be addressed to ensure the integrity and reliability of audit outcomes.

The STAIN framework proposed in the article provides a valuable model for enhancing the quality and trustworthiness of RA. By focusing on security, transparency, accountability, inclusiveness, and neutrality, organizations can build robust systems that support effective RA practices.

Ultimately, RA represents a paradigm shift in how organizations approach quality management and compliance. It reflects the growing importance of agility, innovation, and digital literacy in professional practice. As technology continues to evolve, RA will likely become a standard component of audit strategies, offering new opportunities for improvement, collaboration, and strategic oversight in the digital age.

Future research on this topic could be focused on comprehensive empirical studies based on real datasets and statistical performance indicators to evaluate the effectiveness and outcomes of RA methodology implementation within QMS.

REFERENCES / СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Ariyanto, S. (2024). Implementation of big data and technology in improving the quality of auditors' audit results (Case study at BPK, The Riau province). *Jurnal riset akuntansi dan auditing, 11*(2). https://doi.org/10.55963/jraa.v11i2.667

Barretto, C. R., Drumond, G. M. & Méxas, M. P. (2022). Remote audit in the times of COVID-19: a successful process safety initiative. *Brazilian journal of operations & production management, 19*(03). https://doi.org/10.14488/BJOPM.2021.048

Fabiianska, V. (2017). The concept of quality in the audit practice. *Agrosvit,* (9). http://www.agrosvit.info/?op=1&z=2398&i=10

Фабіянська, В. Ю. (2017). Поняття якості в аудиторській практиці. *Агросвіт*, (9). http://www.agrosvit.info/?op=1&z=2398&i=10

Fadillah, L. S. N., & Pramudyastuti, O. L. (2023). The impact of COVID-19 on audit quality and procedures for external auditors. *Accounting and finance studies, 3*(2). https://doi.org/10.47153/afs32.6382023

Farcane, N., Bunget, O. C., Blidisel, R., Dumitrescu, A. C., Deliu, D., Bogdan, O., & Burca, V. (2023). Auditors' perceptions on work adaptability in remote audit: a COVID-19 perspective. *Economic research-ekonomska istraživanja, 36*(1). https://doi.org/10.1080/1331677X.2022.2077789

Ismanidar, N., Maksum, A., Gultom, P., & Meutia, R. (2022). The Effect of Auditor Competence and Remote Audit Support on Audit Quality through Digital-Based Governance with Information Technology as a Moderating Variable in State Financial Audit. *International Journal of Business and Technology Management, 4*(2). https://doi.org/10.55057/ijbtm.2022.4.2.2

ISO 19011:2018. (n. d.). *Guidelines for auditing management systems*. https://www.iso.org/standard/70017.html

ISO 9000:2015. (n. d.). Quality management systems. *Fundamentals and vocabulary*. 58 p. https://www.iso.org/standard/45481.html

ISO/IEC TS 17012:2024. (n. d.). *Conformity assessment. Guidelines for the use of remote auditing methods in auditing management systems*. https://www.iso.org/standard/84718.html

Khorunzhak, N., Koshchynets, M. & Kondriuk, L. (2018). Institutional foundations of audit quality and audit activities in Ukraine. *The Institute of Accounting, control and analysis in the globalization circumstances*, 3–4. https://doi.org/10.35774/ibo2018.03.067

Хорунжак, Н., Кощинець, М., & Кондрюк Л. (2018). Інституційні засади якості аудиту й аудиторської діяльності в Україні. *Інститут бухгалтерського обліку, контроль та аналіз в умовах глобалізації,* 3–4. https://doi.org/10.35774/ibo2018.03.067

Kljajić, M., Mizdraković, V., & Hadrović, Z. B. (2022). Internal audit in the COVID-19 environment: Key aspects and perspectives of remote auditing. The *European Journal of Applied Economics, 19*(1). https://doi.org/10.5937/EJAE19-35881

Kusuma, D. W. (2024). The Impact of the COVID-19 pandemic on auditing practices: a qualitative analysis. *Golden ratio of auditing research, 4*(1). https://doi.org/10.52970/grar.v4i1.385

Kuzyk, N., Shevchuk, K., & Vershuta, Yu. (2024). Quality as a determinant of the audit of financial statements. *Economy and Society*, (70). https://doi.org/10.32782/2524-0072/2024-70-137

Кузик, Н., Шевчук, К., & Вершута, Ю. (2024). Якість як детермінантна ознака аудиту фінансової звітності. *Економіка та суспільство*, (70). https://doi.org/10.32782/2524-0072/2024-70-137

Leocadio, D., Malheiro, L., Reis, J.C.G. (2025). Auditors in the digital age: a systematic literature review. *Digital Transformation and Society, 4*(1). https://doi.org/10.1108/DTS-02-2024-0014

Liew, A., O'Leary, D., Perdana, A., & Wang, T. (2022). Digital transformation in accounting and auditing: 2021 international conference of the journal of Information Systems panel discussion. *Journal of Information Systems, 36*(3). https://doi.org/10.2308/ISYS-2022-008

Lorentzon, J. I., Fotoh, L. E., & Mugwira, T. (2024). Remote auditing and its impacts on auditors' work and work-life balance: auditors' perceptions and implications. *Accounting Research Journal, 37*(1). https://doi.org/10.1108/ARJ-06-2023-0158

Maharani, N. P., Salim, C. R., & Handoko, B. L. (2024). Internet of Things (IOT) adaptation in remote audit: A quantitative study applying the technology acceptance model. *Journal of theoretical and applied information technology, 102*(6). https://www.jatit.org/volumes/hundredtwo6.php

Matovic, I. M. (2020). PESTEL analysis of the external environment as a success factor of a startup business. *Consensus conference on science and society*. https://doi.org/10.5281/zenodo.4058794

Mbonigaba, C., & Vanitha, N. (2019). The rise of remote auditing: challenges, opportunities, and best practices. *International journal of computational research and development, 4*(2). https://doi.org/10.5281/zenodo.16152007

Mykhalko, R., & Zenkina, S. (2021). Remote audits of global manufacturers of medical devices. *Laboratory Affairs*, (8). https://e.labsprava.com.ua/laboratorna-sprava-2021-8/dystantsiyni-audyty-svitovykh-vyrobnykiv-medvyrobiv

Михалко, Р., & Зенкіна, С. (2021). Дистанційні аудити світових виробників медвиробів. *Лабораторна справа,* (8). https://e.labsprava.com.ua/laboratorna-sprava-2021-8/dystantsiyni-audyty-svitovykh-vyrobnykiv-medvyrobiv

Nowicki, P., & Kafel, P. (2021). Remote certification processes during global pandemic times. SHS web of conferences. *Globalization and its socio-economic consequences*, (92). https://doi.org/10.1051/shsconf/20219201037

Ria. (2023). Remote audit compared to onsite audit, and the capabilities required in the view of internal auditor practices. Al Qalam: *Journal ilmiah keagamaan dan kemasyarakatan, 17*(2). https://doi.org/10.35931/aq.v17i2.1980

Sasai, M., Okamoto, M., Tanigawa, S., Okada, S, Sugiyama, D., & Myoui, A. (2024). Remote audit practice for inspection of structural and equipment standards for cell processing facilities under the Act on the Safety of regenerative medicine in Japan. *Regenerative Therapy* (25). https://doi.org/10.1016/j.reth.2023.12.001

Silitonga, H. T., & Hastuti, T. D. (2022). The Effect of Information Technology Utilization, Professional Skepticism, professional skepticism and auditor competence on Remote Audit Quality with auditor ethics as a Moderating Variable. *International journal of management studies and social science research*, (4). https://doi.org/10.56293/IJMSSSR.2022.4525

Soares, C. A., Shendrikova, D., Crevani, G., Silinto, B., & Colombo, E. (2023). Enabling factors for the development of mini-grid solutions in Mozambique: A PESTLE-based analysis. *Energy strategy reviews*, (45). https://doi.org/10.1016/j.esr.2022.101040

Synhaivska, I., & Lisnichenko, T. (2023). Psychological aspects of internal audit as a quality management system implementation process. *Science Notes of KROK University*, *1*(69), 207–212. https://doi.org/10.31732/2663-2209-2022-69-207-212

Сингаївська, І., & Лісніченко, Т. (2023). Психологічні аспекти проведення внутрішнього аудиту як процесу впровадження системи управління якістю. *Вчені записки університету "КРОК"*, *1*(69), 207–212. https://doi.org/10.31732/2663-2209-2022-69-207-212

Wilasittha, A. A. (2022). The remote audit in the post-pandemic era: professional scepticism and audit quality perspective. *Journal of economics, business, and government challenges*, *5*(2). https://doi.org/10.33005/ebgc.v5i02.285

Wiśniewska, M. Z., Rombalska, M., & Szymańska-Brałkowska, M. (2022). Remote Quality Management System Audit. Auditors' and Auditees' Perspectives and Lessons Learned. *Annales Universitatis Mariae Curie-Skłodowska, section H – Oeconomia*, *56*(3). https://doi.org/10.17951/h.2022.56.3.169-186

Yasmin, A., Kamal B., & Syifaunnisa A. (2023). Remote Audit for Internal Audit as a Form of Technology Optimization Towards Indonesia 5.0. *Proceedings of the Tegal International Conference on Applied Social Science & Humanities*. https://doi.org/10.2991/978-2-494069-09-1_36

Yuniarta, G. A., Purnamawati, I. G. A., Wahyuni, M. A., Dewi, K. S. S., & Sartikawati, K. (2024). Evaluation of remote audit implementation based on the perspective of auditee fraud opportunities due to the COVID-19 pandemic. *The 6th international research conference on economics and business*, (6). https://doi.org/10.18502/kss.v9i4.15112

Yusoff, M. S. B. (2024). A practical guide using the NOISE analysis model for strategic action planning in health profession education. *Education in Medicine Journal*, *16*(2). https://doi.org/10.21315/ eimj2024.16.2.15

Zaferar, A., Johari, R. J., Zarefar, A., & Rasuli, M. (2024). The effect of auditor quality and remote audit on audit quality in Indonesia: moderating role of information technology. *Journal dinamika akuntansi*, *16*(1). https://doi.org/10.15294/jda.v16i1.4031

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