A critical review of determinants of e-audit risk revolution in KSA

By

Dr. Fathimunisa Hanfy
Assit Professor, Department of Accounting, Saudi Electronic University, KSA
Email: f.hanfy@seu.edu.sa

Dr. Maysoon Khoja
Assit Professor, Department of Accounting, Saudi Electronic University, KSA
Email: m.khoja@seu.edu.sa

Abstract

Industrial advances over the decades have led businesses to redesign their strategies according to the digitalization of the present age, and this is reflected in the audit profession. Organizations now employ electronic auditing and so the redesigning and revolution of e-audit risk is a widespread technique as part of the audit assurance process that requires organizations to employ talented experts. Unicorns specialized in Information Technology (IT) and accounting proficiency are in great demand. There is a need for auditors to put technology front and foremost in their minds to leverage from it and to add value to the accountancy and auditing professions. This study identifies determinants that have given rise to reengineering and revolutionary opportunities in e-auditing with respect to e-audit risk management techniques that can overcome challenges of the traditional audit process. The present study critically reviews the existing literature to suggest a list of determinants affecting e-audit risk, focusing on e-audit risk determinants from 1991 to 2020. The study uses a descriptive research design: employing content analysis and descriptive statistics to analyze the 16 determinants identified and classified into five groups. These groups, identified as major sources of e-audit risk revolution, are Organizational, Economical, Technological, Regulations and Standards, and Evaluation.

Keywords: E-audit risk determinants, e-audit risk revolution, E-audit advanced tools.

Introduction

Digitalization today is nothing new, but there is an ongoing review of the use of Information Technology (IT) in overcoming the challenges of traditional audit practices, and its requirement for quality information and data through qualitative research (Torraco, 2016). Many studies have interviewed auditors and interpreted their experiences, the relevance of their knowledge, and their understanding and trust of the audit profession, as examined by Power and Gendron (2015), Berger (2015) and Noble and Smith (2015). However, with digitalization improving feasibility in many aspects, this has forced organizations to move towards revolutionary advanced tools in digitalization that generate new information in large quantities (Granlund, 2007; Holley, 2004; Iuliana & Tugui, 2005; Spraakman et al., 2015). According to Bierstaker et al. (2001), Granlund (2007) and Spraakman et al. (2015), the audit profession is predicted to increasingly rely on digital information and the ability to adapt to new working methods with flexibility and efficiency. This is also expressed by Nearon (2005), who highlights the arising job opportunities that improve digital working methodologies. Introducing audit procedures which increase the effectiveness and efficiency of practices for better audit productivity has encouraged e-audit risk revolution (Han et al.,

2016; Janvrin et al., 2008; Lombardi et al., 2015). Time-consuming quality assurance processes can be replaced by Artificial Intelligence (AI) in the auditing of smaller firms for the long term (Pascal & Dorian, 2017). This is an example of IT helping revolutionize e-audit risk for high-level assurance.

It is important to recognize increased audit risks throughout the accounting cycle as a result of such revolutions in audit developments, efficiencies, effectiveness, productivity and proficiency, as explored in a study by Chou (2015) on the manipulation of documents. It is necessary to reduce risk, eliminate duplication and improve control systems throughout the multiple frameworks of an accounting environment, including production cost, marketing and sales burdens and benefits (Rezaee et al., 2002; Potla, 2003). Studies by Barta (2018) demonstrate how cyber risks caused by the increasing dark phase of IT bring new developments into e-audits, thus changing the requirements of auditor's profession from being a certified accountant to being a certified IT-skilled accountant. Many studies have pointed out that such risks arise due to lack of knowledge of IT systems (Han et al., 2016). IT plays a vital role in overriding such risks, as many experts advocate educating staff on digitalization tools to cover the e-audit procedures and practices supported by the Compliance Technology Automation (CTA). Geerts et al. (2013) suggest a framework to aid in the integration of IT accounting research and practice, which comprises three cycles: Relevance, Design, and Rigor. It also requires alignment between academic research and practical relevance, leveraging the existing knowledge as a base to help, develop, evaluate, or justify the accounting information system artifact. Therefore, this study analyzes techniques to mitigate e-audit risks through the application of IT systems, with a keen understanding of the following terms.

E-audit

E-audit, in simple terms, is a custom-designed software to perform electronic data conversion and analysis. E-audit uses various audit techniques, including electronic accounting records, to complete the accounting and auditing cycle. Hunton et al. (2003) highlight the use and importance of digitalization in their article on datafication, digitization, and data standardization network and system connectivity.

E-audit Risk

According to Taylor (2002), audit risk is identified as the probability that the auditor has an inappropriate professional opinion on the financial statements and such risk has a variety of forms, including significant risks, control risks and risks of discovery. Digitalization of audit, known as electronic auditing, or e-auditing, is a computer-assisted auditing technique that uses electronic records through an automation of the audit process.

E-audit Risk Revolution

Innovation has revolutionized the process of the e-audit and the risk of inappropriate opinions of auditors on financial statements, because of changing technology, advanced software, technology compliances, and so on. Kruskopf et al. (2020) present research on whether potential tools, such as human-machine, robotics and AI (referred to Industry 4.0) impact business. ABBYY (2019) describes a PwC and ABBYY investigation of flexi capture which automatically and rapidly identifies document types, improves images, and transfers data from invoices, and structured and unstructured documents.

E-audit Risk Determinants

E-audit risk determinants are identified through electronic records as material misstatements on financial statements. However, the audit opinion may state that the financial reports are free of any material misstatements. Emerging threats may lead to specific economic

and financial crises within an organization that is moving towards digitalization. As according to Titera (2013), redefining the level of audit evidence to gain audit procedures for coherence testing with inherent limitations of an audit for assurance levels shows the risk appetite of the business organizations.

E-audit Advanced Tools

These are electronic, digital or physical tools with a human-like capability for performing tasks or generating audit services, used to obtain evidence through electronic means to determine the extent of conformity to the audit criteria. Such tools offer protection of assets, and reputation of staff of accounting firms and their customers, as researched by Zhou (2017). Ernst and Young's (EY) detection program has an accuracy of 97%, a valuable tool in everyday work for accountants and auditors.

Literature review

Technology is reshaping every element of life, with each advancement pushing the boundaries of the human race with new revolutions and capabilities. As no exception, this has led business organizations and audit firms to find new ways to deal with accounting and auditing. In this study, the literature of more than 80 authors has been examined, along with website information and auditing standards. This paper aims to critically review the information and to determine the factors that affect e-audit and its affiliation to e-audit risk for high-level assurance. The review is classified into five groups to meet the objectives of the study.

Business Philosophy

Critical review of e-audit risk based on organizational factors defining business philosophy:

This study has identified certain determinants, such as Age of the Firm, Capital Optimization, Productivity & Profitability, Risk Appetite, Co-operation/Collaboration, Firm's Efficiency Leverage and Training of Employees, as organizational factors leading to inherent audit risk, and reflecting the business philosophy. Business organizations and audit firms that strategically maintain systematic audit processes (Moheeb, Al-Saai, 1991) obtain the necessary evidence of economic events and conduct evaluations for the purpose of verification. Advances in technology, and present-day environmental changes, have highlighted the use and importance of digitalization, as argued by Hunton et al. (2003) in their article on the importance of datafication, digitization, data standardization, and network and system connectivity. These approaches in e-audit and e-audit risk procedures provide technical and economic feasibility of analysis using visualization methods and tools for data accessibility and interaction. However, the rise of electronic commerce operations has pushed business organizations to improve the speed and timeliness of their information as mentioned by Al-Mutairi, Obaid (2004), for benefits and proficiency in accountancy in the audit field. Traditional audit practices and standards evolve according to present day challenges and desires and the demand of companies and financial markets. According to Lutfi, Amin (2005), technological development of information systems has encouraged the business environment to reform and develop accounting standards and guidelines. Reshaping the business environment with IT to capture data, as noted in studies by Alles et al. (2006) and Kogan et al. (2010), is a present-day trend in business activities. IT and data structuring encompass the Third Industrial Revolution, as stated by Mayer-Schönberger et al. (2009), and has fueled the economy and needs to be customized to meet the present-day need.

Regarding organizational productivity and profitability, the big four including Mike Willis and PriceWaterhouseCoopers (2012), focus on changes in current practices, procedures, processes and mentalities to increase productivity by a measurable, substantial and clear process of creating an external financial report.

According to Titera (2013), redefining the level of audit evidence to gain audit procedures for coherence testing with inherent limitations of an audit for assurance levels shows the risk appetite of the business organizations. Integrating IT accounting research and practice leads to the identification of three cycles, Relevance, Design, and Rigor, as a framework designed by Geerts et al. (2013) to focus on the alignment between academic research and practical relevance, and leveraging the existing knowledge base to help develop, evaluate, or justify the accounting information system artifact. There is a need for feasible model-based data that enable audits to research technical and methodological aspects of their business for economical and societal purposes, as referred to in studies by de Boer, Eimers and Elsa (2014), which explore the effectiveness of traditional audit approaches and procedures and opportunities for reengineering further.

Schneider, Dai, Janvrin, Ajayi and Raschke (2015) discuss the emerging management and regulatory challenges related to data analytics and suggest new research opportunities where automation of audit procedures improves the audit process. As researched by Petropoulos (2017), industries emerging with a significantly positive impact on employment can significantly reduce the labor cost of bank tellers.

There is a need to educate auditors to build competence in digitalization in the audit profession, as expressed by Karlsen and Wallberg (2017), to improve the auditor-client relationship for flexibility within the profession and regarding attitudes towards changes. Making auditors responsible for reviewing financial statements, as stated by Sonu et al. (2017), leads to legitimacy theory in audit firms. Protection of assets, reputation and staff of accounting firms and their customers is necessary, as researched by Zhou (2017), and considering EY's detection program that has an accuracy of 97 %, a valuable tool in everyday work for accountants and auditors. Further studies of Thomas (2018) show EY using Blockchain Analyzer, a technology created to help auditors to collect a company´s transaction data from various blockchain ledgers. EY also uses natural language processing (NLP) in reviewing lease accounting standards in cases when the Internal Revenue System (IRS) issues new regulations. EY Global Assurance Innovation Cryptocurrencies like BitCoin, LiteCoin, a trust to the capital markets. Blockchain financial processes innovate the audit to meet their evolving needs and those of investors.

After considering many techniques described by e-audit authors like Daugherty and Wilson (2018) and Marr (2018), it is noted that real-time data processes are adaptive and flexible in nature. Innovative and more individualized products and services harness the power of technology and complement human capabilities with hybrid human-robot tasks.

E-audit revolution continues to explore digital and general-purpose financial reports that offer collaborations between humans and machines, considering views that believe 'Human is complete with Machine' and 'Machine is complete with Human'. Organizations require adaptability, innovativeness, sales skills, effective communication, and customer-oriented support capabilities, thus leading to e-audit risk revolution.

According to Zhang, Dai and Vasarhelyi (2018), disruptive technologies that change the accounting and auditing training are reshaping accounting business models with robotic

process automation, AI, advanced analytics programs and blockchain as these require more sophistication to be taught at high-level skills.

As researched by Onyshkevych (2018), an accountant or auditor can acquire practical insights from extracted data to use in their work. Similarly, Mills' (2019) study on NLP, a form of AI, combines computer and linguistic tools, such as spellcheck, autocorrect and the Google search function. FinTech Weekly (2019) looked at the future of accounting and auditing in two new industries, considering FinTech as robo-advisors and RegTech to tackle regulatory challenges in the finance industry. Kiratsopoulou and Kjellberg (2019) perceived differences among small and big audit firms in their concept of how digitalization effects the audit process. Studies of Abdelbagi Elamin (2020) looked at how financial information processing systems (the accounting system) oblige auditors to inspect the website's information system to assess the risks surrounding it as well as link to it. Accounting information system (AIS)seeks to ensure that financial treatments are carried out for the operations that have taken place through the company's website. Adding value to business organizations, authors like Kruskopf et al. (2020) have looked for potential tools and skills required for a successful and enduring career in either accounting or audit with acquired potential knowledge. Human-machine cooperation robotics and AI Industry 4.0 impacts business. Time consuming and repetitive work becomes automated, the right skills are encouraged to prosper into the future. Thus, this study aims to conduct a critical review on e-audit risk based on organizational and economic factors heading business philosophy.

Past Erroneous Transactions

Critical review of the accounting cycle and e-audit risk factors:
Many articles offer a feasible explanation of audit risk, but the present technology and changing business environment has brought about a revolution in the audit profession, creating new challenges in the e-audit risk procedures. This study highlights the factors affecting e-audit risk revolution as found in the literature. Studies always consider e-audit systems to be of higher quality than traditional audit models, as stated by Blokdijk et al. (1995) via an audit data analysis giving access to the metadata that recognizes a value cycle linking the traditional accounting cycles in the financial statements. The Dutch auditing theory, a 'model-based data enabled' approach to auditing forms part of comprehensive coherence testing. An industry-expert auditor needs data that deals with assertions at all levels, including transaction event level, account balance level, and presentation and disclosure level, considered high priority as stratified inherent limitations level of assurance across financial statement line items stated by the European Federation of Accountants (FEE, 2007) as assertions, completeness may result in a lower level of assurance.

Further, there are quantitative and qualitative factors affecting risk assessment and Internal Control, as stated by Al-Kabbani, Thanaa (2008), who examine e-commerce operations and the principle of materiality as an important consideration for information systems. However, this can be appropriate for large companies who use spreadsheets to prepare their financial statements for periodic external reports, and typically find an inefficient and error-prone process when using new technology for substantial output, as noted by Rayner and Chandler (2008) and also the research of Kugel, Ventana (2009).

According to Jans et al. (2010), such substantiality can be better processed by mining a data analytics technique that uses data recorded automatically and independently. As automation of data brings more assurance, auditors play a key role in processing data mining

techniques, as researched by Van der Aalst et al. (2012). The practice of auditing financial statements, however, leads to e-audit risk revolution where there is the potential to generate effectiveness and efficiency benefits over traditional methods in business processes and to avoid an understatement or overstatement of profit being identified by auditors, as mentioned in the research of Weigand and Elsas (2012). Studies by Malˇaescu and Sutton (2015). Focusing on automation enables the external auditor to gain confidence and offer reliability in the reports generated by internal audit automation, and for a reduction in the cost and business impact. Spreading the workload over the year, rather than it being concentrated at the end of a financial cycle or during an audit, is also noted as a revolution in e-audit risk.

Yoon et al. (2015) discuss how technology manages the costs associated with external auditors, external stakeholders, and other people involved with the organization's technology, and how Big Data provides evidence beyond a traditional audit.

Techniques such as XBRL-based structured digital financial reports, as stated by Singh and Peters (2016) in their studies on paper-based and electronic versions of financial reports, were not understandable by computer processes. Thus, as pointed out by Han et al. (2016) and Dzuranin and Malaescu (2016), there are new risks emerging along with digitalization and emergence of new software, while in-depth analysis has come forth and the efficiency has increased with audit risk revolution. In the same context, studies by Hoffman (2017) consider financial reporting to be currently getting a face lift, while what goes into financial reporting is not really changing: XBLR-based structured digital financial reporting, knowledge-based systems, Robotic Process Automation (RPA), and other applications of AI and blockchain-based distributed ledgers are trending in the audit profession.

As shown in research of ABBYY (2019), PwC and ABBYY have investigated flexi capture which automatically rapidly identifies document types and improves images, data transfer from invoices, contracts and other structured and unstructured documents. It also includes accounting systems for customers that extract the required data and further transfer the data into a master spreadsheet. As noted by Deloitte (2019), using Deloitte US Blockchain Lab offers advantages in trade finance, cross-border payments, digital identity, fraud detection, reward programs investment management and insurance sectors, and in particular fraud detection for transactions in real-time to obtain a risk score based on the matching transaction IDs, thus leading to e-audit risk revolution.

Technology Obsolescence

Critical review of audit risk based on technological factors:
Technological advancement, development and feasible technology may create factors that influence e-audit and e-audit risk revolution. The below literature has been considered to meet the objective of the study.

Digital technology is valued as the primary source of innovation in the world of technological advancements, as stated by Shapiro and Varian (1999), defining IT as digitalized information, where the focus lies within the value of information. The audit profession has benefitted from advancements in IT, with automated techniques and digital utensils for dependence on digitalization, as noted by Shumate and Brooks (2001). Alles et al. (2006) describe how IT and data capturing have reshaped the business environment, trends in business activities, and data structuring. Studies by Granlund (2007), Holley (2004), Iuliana and Tugui (2005) and Spraakman et al. (2015) have focused on knowledge and information as keywords in society as digitalization offers a tool to provide new information regardless of volume.

Adding value to the new technologies, authors like Dai and Vasarhelyi (2016) have focused on how audit 4.0 utilizes data collection equipment such as sensors, embedded computers and software modules to collect data across the entire company and its outside entities, such as suppliers and customers, via a network in close-to-real time. Re-balancing the concepts of lines of defense will be applicable to many types of assurances (external, internal, specialized) with automation.

Gepp, Linnenluecke, O'Neill and Smith (2018) investigated the combination of traditional audit techniques and expert judgement to improve recent financial distress and financial fraud models in Big Data. Logical analysis and NLP tools are well suited to Big Data techniques, such as real-time information settings, collaborative platforms and peer-to-peer marketplaces. Consider a combination of multiple Big Data models with rigorous analytical procedures that with the robotic approach can bring audit practice into a timely manner and evaluate an effective Big Data technique in an auditing context, with associated cost-benefit analyses and studies that consider the best ways to combine Big Data modelling with expert judgement.

Chan et al. (2011) investigated the ability of computer-aided audit techniques (CAATs) to enable efficient audit testing. The effectiveness of traditional audit procedures having strongly evolved in the audit environment in terms of increased data analytics poses challenges for experiences and practices in auditing.

Innovations of IBM (2013) and studies by Vasarhelyi (2013) consider Big Data, and the associated three V's in auditing, namely volume, variety and velocity. CAATs and process mining is known as inside data and Big Data is considered outside data. Hardware environments and software tools are required to capture, manage and process Big Data. The CFA Institute (2016) purports the possibility of greater efficiencies within the current inefficient system by using a human-machine collaboration to create financial reports. The need for accountants and auditors to perform higher value work is highlighted by Forbes (2018) in a discussion on specific expertise with automated advanced tools to detect risk and fraud, thus raising an e-audit risk revolution.

Critical review of audit risk based on compliance related factors:

Technological obsolescence generally occurs when a new product replaces an older version that is affected by compliances, standards, regulations, labor force skills, client knowledge and their ability to use the tools, and so on. The below literature has been considered to meet the objective of the present study. In brief, a technology compliance audit can be defined as a comprehensive review of a business organization's adherence to regulatory guidelines, to evaluate and improve the effectiveness of risk management, internal controls, IT controls, business process design, compliance requirements, and so on. Rezaee et al. (2002) and Potla (2003) note the benefits of compliance technology automation to reduce risk, and eliminate duplicate controls in all aspects of business, as agreed by Pathak et al. (2005). CTA, as stated by Pathak, Nkurunziza and Ahmed (2007), Nigrini and Johnson (2008) and Searcy, Ward and Woodroof (2009), can be used to build credibility with auditors and customers.

Furthermore, regarding technology compliance, IAASB (2009) reformulated and redefined the principles of auditing providing clear objectives, requirements to reach the objectives and identifying application material needed to guide the auditor for a reasonable assurance of financial statements free from material misstatement, fraud or error, and prepared, in all material respects, applicable to the financial reporting framework. Abdel-Ala, Tarek (2010) discusses the laws and regulations of the e-commerce environment, amendments in standards, and compliance even for the international e-commerce environment.

AICPA (2012) discusses the incorporation of software for assurance and monitoring of the franchisor/franchisee relationship and establishment of an assurance services executive committee. The Emerging Assurance Technologies Task Force was created to aid auditors in generating great effectiveness and efficiency benefits over traditional methods in business processes. To tackle methodological issues and challenges in current auditing standards, as considered by Zhang et al. (2012), it has been necessary to redesign audit procedures and consider emerging issues about audit evidence, the use of data analytics techniques, and with the implications on the auditor's risk assessment and the auditor's ability to obtain sufficient and appropriate audit evidence.

As per IAASB (2013), there have been developments regarding the use of electronic data. IAASB (2016) released the ISA 540 (Revised), which is effective for audits of financial statements and for addressing IASs for audit data analytics, as auditors with good traditional techniques need to integrate their skills with advanced technology in audit.

Deloitte (2014) discusses the 'Changing Technology, Changing Culture Digital Accountability and Transparency Act' of 2014 which came with a hope for the year 2022 regarding the effective implementation of the act. EY, Deloitte and PwC embody AI: EY uses NLP when reviewing lease accounting standards in cases when the IRS issues new regulations, while PwC uses AI sprints for accuracy (Vasarhelyi, Warren, Teeter & Titera, 2014). Auditing and accounting standards need to become firm auditing standards, which is necessary to facilitate and stimulate audit innovation in a historically strongly regulated profession. Similarly, Adeyemi, Mohammed, Ogundeji and Oladipupo, Tijani (2014) look at tools employed by internal audit departments and their reliance on audit tools for providing effective audit assurance and to reduce perceived gaps existing in the use of audit technology tools. Standardized metrics to determine the impact of deployed technologies audit should be included with outcomes and output measures, according to Information Systems and Control Association (ISACA).

There are regulatory bodies that concern cyber security (SEC, 2015), and the SEC Office of Compliance Inspections and Examinations (OCIE) issued a cybersecurity initiative in 2014 focusing on the securities industry. Raphael (2015), O'Donnell (2016) and KPMG (2016) discuss CTA with KPMG and the effect of the Audit Data Standards working group on the potential use of crowdsourcing to develop audit applications. Studies of Dzuranin and Mal (2016) look at Big Data, compliance and emerging technology issues for both internal audit and external audit perspectives.

Voster (2017) considers a broader trend referred to as RegTech Audited, which has no manual interference Manual audit steps with added value. Manita et al. (2020) talks about implementing digital strategies for regulators, including modifications that need to occur for audit standards. This would enable business schools and universities to adapt training programs according to audit firms' expectations.

Qualified Audit team

Critical review on audit risk based on continuous monitoring factor:
Continuous monitoring is a mechanism used by internal audit or management departments to monitor e-audit systems, from the point of transaction to disclosure, and with the ability to apply control frequently or continuously throughout a given period. However, a continuous risk monitoring and assessment methodology is used to monitor an organization's business risks, for the timely mitigation of such risks. As a result of digitalization of internal audit processes and corporate governance, audit committees enforce the impact of

digitalization onto small audit firms and the recruitment policy of audit firms. Therefore, this study will look at determinants like e-audit risk, client opinions, the external environment and profitability, as continuous monitoring factors, and critically reviewed through the literature by many authors, such as Sirikulvadhana (2002), who considered employment and the training of team members in e-audit risk assessment. Continuous monitoring is also concerned with employee retention in the context of digitalization, as flexibility can have a positive effect by replacing lost jobs with new opportunities (Ghasemi et al., 2011; Granlund, 2007). In support, Frey and Osborne (2013) from Oxford University, estimated that 47% of U.S. jobs will be displaced by automation within the next two decades.

Agrey (2014), Kuusisto (2017) and Gantt et al. (2016) researched the effects of digitalization tools and working methods of the audit profession in explaining hermeneutics as an epistemological position comprehensive interpretation to create increased knowledge. Marr (2018a) investigated power in Industry 4.0 and how it introduces a network of smart machines that are interconnected and can create, analyze and share information. A company's assets and people can be marked by the development of analytics, robotics, cognitive technologies, AI, quantum computing and so on, and this leads to training the team with advanced technology for continuous monitoring. Byrnes et al. (2018) looked at audit risks, suggesting that increased knowledge regarding IT-systems may lead to mitigation of certain risks; therefore, education and training becomes a must.

Furthermore, there is a need for advanced software, as mentioned by Korn Ferry (2018). Blockchain is a shared database with a series of data for potential uses, such as managing property records, banking, supply chain auditing, and so on. In addition, anti-money laundering (AML), know your customer (KYC), stock trading, smart contracts and crowdfunding, all help the audit profession to avoid e-audit risk to a maximum level for assurance. The studies of Thottoli and Thomas (2020) consider a positive relationship between three components of information communication technology (ICT) and their influence on audit practice, such as ICT adoption, ICT competency (negative relationship) and ICT training. This encourages accounting and auditing professionals, auditing professional institutions and their management, government, tax officials, policy makers, auditing software vendors and other stakeholders to consider adopting ICT and implementing customized audit software for audit practice within the team. Similarly, Ammar and Nadia (2020) prove a significant relationship between digital auditing and audit quality and strategy in audit firms in the Kingdom of Bahrain, which has led to an increase in the cost of auditing services for achievement in audit assignments. Many studies point out that engaging auditors and accountants with scientific knowledge in AI techniques is required and that training the audit team with specialized IT in auditing will result in a qualified audit team.

Problem Statement:

This critical review of the literature guides us to investigate the factors leading to e-audit risk revolution in the Kingdom of Saudi Arabia (KSA). The study aims to determine whether audit firms and organizations prioritize digitalization in the audit profession, or whether they prefer the manual method. How far are they able to go in managing audit risks through digitalized audit tools? The main aim of the study is to increase understanding about digital audits compared to manual audit techniques by comparing the findings with previous research in the field. This sets the context for the key objectives of the study.

Objectives

1.   To identify manual and e-audit procedures and practices followed in KSA firms and organizations.

2.   To highlight the ideal determinants of e-audit risk revolutions in firms and organizations in KSA.
3.   To analyze the revolutionary confidence over risk assessment tool that covers technology obsolescence.

Research Methodology

The study identifies the determinants of e-audit risk revolution through literature review. Since the study critically reviews the existing literatures through content analysis, it uses a descriptive research design to analyze the data. Literature focusing on e-audit risk determinants from the period 1991 to 2020 is included in the study. According to Downe Wamboldt (1992) and Morgan (1993), content analysis employs a descriptive approach in both coding of the data and its interpretation of quantitative counts of the codes. The study will use a relational content analysis, which begins like a conceptual analysis, whereby a concept is chosen for examining and exploring the relationships between concepts and descriptive statistics are used to explore the determinants.
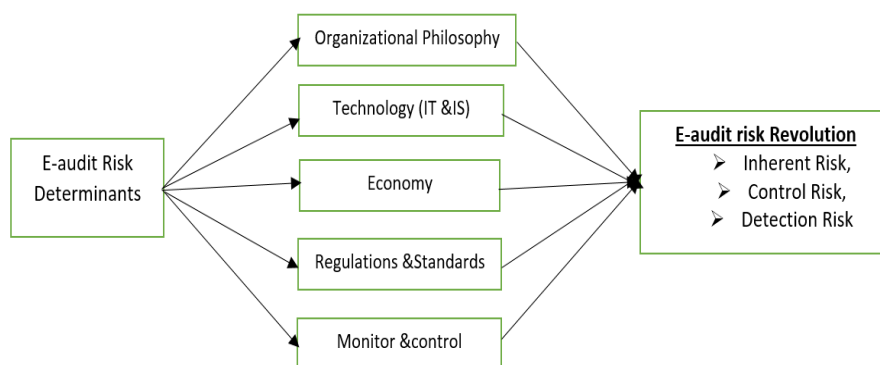
Figure (1) *Research Design*

The research design is based on the 16 different determinants identified from the five key concepts obtained from the literature review of e-audit risk and the creation of a new revolution. As shown at figure (1), these five conceptual groups are Organizational Philosophy, Technological (IT & IS), Economy, Compliance (Regulations & Standards), and Monitor and Control and are considered major sources of e-audit risk revolution due to changing technology, as explained below.

E-audit risk based on organizational philosophy

The concept by which every firm and organization philosophically frames its strategic plans, including how they are affected by determinants that create revolution, such as:

1.   Investments and returns (I&R), which depend on the new techniques and trends, affecting e-audit risk.
2.   Product design (PD), a data analytic tool as per new techniques and trends, affecting e-audit risk.
3.   Manpower and productivity (MP&P), concerning employee qualification and training on changing technology and trends, affecting e-audit risk.
4.   E-audit risk (EAR), about flexibility, effectiveness and efficiency of firms and organizations, affecting e-audit risk.

E-audit risk based on economy

Economies can be affected by technology and new trends, as noted by Breman and Felländer (2014), FAR (2016) and Forbes Insights (2015) who described how digitalization can lead to lost job opportunities but that, on the flipside, can also positively support auditors. There is a case for an increase in education and flexibility among auditors to prevent job opportunities being lost as a result of e-audit risk, such as:

5.   Audit team and retention (ATR), affecting e-audit risk.
6.   Competitiveness and price optimization (CPO), affecting e-audit risk.
7.   Profitability and cost benefit (PCB) modules, affecting e-audit risk.

E-audit risk based on compliance (regulations and standards)

The research of Power and Gendron (2015) evaluates how to meet standards on appropriateness, honesty, completeness and policies in accordance with regulations and standards with specific instructions to auditors regarding digitalization, and how they are affected by determinants, such as:

8.   Standards and regulations (S&R) on changing technology, affecting e-audit risk.
9.   Cyber security and data protection (CSDP) regulations on changing technology, affecting e-audit risk

E-audit risk based on technology

Firms and organizations are now supplied with data on trends in information system and IT. Auditing is possible with automated techniques like CAATs for reliability, security and confidence regarding the accounts or the report with own biases, as noted by Power (2003). Such technology can be affected by determinants such as:

10.   New technological advancement changing technology and trends (TAT), affecting e-audit risk.
11.   Flexible technology (FT) with sophistication and audit team handling, affecting e-audit risk
12.   Cloud computing and cyber security (CCCS), affecting e-audit risk.

E-audit risk based on continuous monitoring and controlling

An innovation by Chou and Chang (2010) with a technical framework, is the external continuous auditing machine (ECAM), which performs online control testing and continuous substantive testing over web-releases, disclosing an auditing environment on continuous auditing as the most appropriate approach for web-releasing assurance. This can be affected by determinants such as:

13.   Talent management's appetite level (TMA) to digest changes in technology, affecting e-audit risk.
14.   Audit team's level of assurance and satisfaction (ATA) due to changes in technology, affecting e-audit risk.
15.   Operational process and error control (OPC) by the audit team with changes in technology, affecting e-audit risk.
16.   IT governance (ITG) reduces the number of errors with changes in technology, affecting e-audit risk.

These determinants will be surveyed through a structured questionnaire, and statistically analyzed at 5% confidence level to check its significance for using e-audit reducing manual audit system in companies in Riyadh, KSA.

Research Analysis

Demographic characters of the study sample

Table 1 presents the study sample in terms of its demographic characters, such as age, and reveals a majority of 75.4% falling in the age category of 30 to 50 years, thus representing a matured group likely giving reliable responses. There is a majority of males (65.8%). The majority of respondents hold a bachelors or master's degree, with a total of 91.3%, and most of the managers and employees in the profession having a major in accounting and finance (75.4%). This is a positive indicator of the likely validity of the results and recommendations of the study. Noting that 70.1% of respondents are experienced with e-auditing tools indicates that the statements of the questionnaire are likely to have been well understood by the majority of respondents in the study sample.

Table 1: *the demographic characteristics of the study sample*

Classification	Characters	List	Frequency	Percentage
First	Age	<30 years	24	21.1
		30–40 years	44	38.6
		40–50 years	42	36.8
		>50 years	4	3.5
		Total	**114**	**100.0**
Second	Gender	Male	75	65.8
		Female	39	34.2
		Total	**114**	**100.0**
Third	Qualification	Diploma in accounting	4	3.5
		Bachelors in accounting	58	50.9
		Masters in accounting	46	40.4
		Doctorate in accounting	6	5.3
		Total	**114**	**100.0**
Fourth	Major qualification	Accounting	70	61.4
		Finance	16	14.0
		Business	28	24.6
		Total	**114**	**100.0**
Fifth	Years of service	1–3 years	14	12.3
		3–5 years	46	40.4
		>5 years	54	47.4
		Total	**114**	**100.0**
Sixth	Role in the firm	Supervisor	18	15.8
		Employee	54	47.4
		Manager	42	36.8
		Total	**114**	**100.0**
Seventh	Use of e-audit	<1 year	6	5.3
		1–2 years	28	24.6
		3 years	42	36.8
		>4 years	38	33.3
		Total	**114**	**100.0**

In analyzing the first objective through descriptive statistics, which asks about identifying audit procedures and practices in KSA, the study found that most firms and organizations use e-audit, as the mean is 2.42 (Table 2), thus indicating use of digital and both manual and digital audit practices, with a standard deviation of 0.623. There were positive responses from the respondents, indicating that KSA is likely to move towards digitalization. Audit teams are being encouraged and motivated by the quick and fast process, but with a small percent still fearing the risk appearing to be present.

Table 2: *manual/e-audit procedures and practices KSA firms and organizations follow*

No.	Statement	Arithmetic mean	Standard deviation
1	Type of auditing and accounting system used in your Firm (1. Manual / 2. Digital / 3. Both manual and digital)	2.42	0.623
2	Type of e-audit and accounting system in your Firm (1. ERP / 2. Oracle / 3. Others)	1.74	0.831
3	Are you happy with the e-auditing and accounting system (1. Yes / 2. No)	1.14	0.349
4	Motivated and excited to work with e-auditing and accounting system (1. Yes / 2. No)	1.11	0.308
5	Recommend e-auditing and accounting system for organizations that are yet to adopt it (1. Yes / 2. No)	1.07	0.257
6	There is a change in the overall output since the adopted e-auditing and accounting system (1. Yes / 2. No)	1.12	0.330
	Average	1.433	

However, the comments section specifies that firms and organizations are moving from ERP and oracle to new software that is more flexible and feasible in satisfying financial constraints. The respondents highly recommended the e-audit procedure for all large and medium firms.

Testing hypotheses

The study tested its first hypothesis using a one-sample t-test with a significant level of 5%. The main hypothesis was framed to meet the study objective, hence H0: There is no statistical significance on manual/e-audit procedures and practices in KSA firms and organizations. The study would accept the null hypothesis if the calculated t-value was less than the tabular value. The study also employed a descriptive method, which considers the frequencies, the arithmetic average, and the standard deviation to determine whether to accept or reject the null hypothesis.

Table 3: *First hypothesis test results*

Calculated t-value	Tabulated t-value	Significance	Result of H0	Mean
7.802	1.96	0.000	Reject	1.433

Table 3 interprets the above calculated t-value (14.73), and shows that it is greater than the tabulated t-value (1.96), thus dictating that the study must reject its null hypothesis and accept the alternative hypothesis that manual/e-audit procedures and practices are present in KSA firms and organizations.

To analyze the second objective, the study used descriptive statistics, which states ideal determinants that are involved in e-audit risk revolution in audit procedures and practices in KSA. All determinants were scaled with different scales to obtain appropriate measures. Those determinants with Likert scale-type codes (1 for strongly disagree, 2 for disagree, 3 for uncertain, 4 for agree and 5 for strongly agree) are organization philosophy, economy and regulatory standards.

Interpretation: The study found that the determinants organizational investments, data analytics software, audit team and e-audit risk of organizational philosophy had an average of 4.30, indicating that firms and organizations are in a revolution for the successful adoption of e-audit and suggests that the determinants be strategically evaluated in the future. However, organizational investments display the highest mean whereby innovations on investments should be planned strategically.

The determinants mentioned like, Employee retention, Competitiveness and price optimization, Profitability and cost benefit, Modules to optimize income supporting economic issues have an average of 4.13, suggesting that that firms and organizations are being highly influenced in a revolution towards the successful adoption of e-audit, and these determinants should be strategically evaluated in the future. However, employee retention had the highest mean (4.43), suggesting that innovations on employment need to be planned strategically.

Table 4: *statistical results on the ideal determinants covering the three groups of e-audit risk revolutions in firms and organizations in KSA*

No.	Statement	Arithmetic mean	Standard deviation
	Organizational determinants		
1	I&R - Organizations have increased investments and returns in advanced technology referred to Industry 4.0.	4.56	0.659
2	PD - Data analytics (product design) has strongly affected the way organizations assess and compile relevant information, including audit risks.	4.27	0.754
3	MP&P - E-auditing and accounting system will be beneficial in providing qualified manpower that will enhance productivity	4.13	0.985
4	EAR - Establishing e-auditing research system increases capacity level of identifying audit risk	4.22	0.756
	Economical determinants		
5	ATR - Retention of successful auditing team can solve the audit risk they encounter while dealing with the clients	4.43	0.658
6	CPO - Establishing e-auditing and accounting research system determines a competitive right prices for services provided by the audit firms	3.94	0.851
7	PCBM - Defining the clients complains contributes to the success of the audit firm's goals and the increase in income	4.02	0.847
	Regulation & standards determinants		
8	S&R - Establishing successful auditing team can maintain international levels of audit standards	4.40	0.751
9	CSDP - Data protection regulation applicable and focused on cyber security affects audit risk.	3.98	0.922
	Average	4.217	

The determinants international levels of audit standards, data protection regulation applicable and focused on cyber security affects audit risk of regulations and standards have an average of 4.19, thus suggesting that firms and organizations are being highly influenced towards a revolution for the successful adoption of e-audit, and these determinants should be strategically evaluated in the future. However, international standards had the highest mean (4.40), indicating innovations on enforcement of standards for protection need to be planned strategically.

The above interpretation shows that these determinants stand as a revolution to firms and organizations in adopting advanced technology. There were positive indications from the respondents that KSA is likely to move towards digitalizing the audit profession. Audit teams appear to be encouraged and motivated by the quick process, although a small proportion report a fear of risk.

The study therefore tested its second hypotheses using a one-sample t-test with a significance level of 5%. The null hypothesis, framed to meet the objectives, is as follows. H0: There is no statistical significance on determinants of e-audit risk in KSA firms and organizations. The study would accept the null hypothesis if the t-value calculated was less than the tabular value. The study also employed a descriptive method, which considers the frequencies, the arithmetic average, and the standard deviation to determine whether to accept or reject the null hypothesis.

H0: There is no statistical significance on determinants of e-audit risk.

Table 5: *Second hypothesis test results*

Calculated t-value	Tabulated t-value	Significance	Result of H0	Mean
15.85	1.96	0.000	Reject	4.217

Table 5 shows that the above calculated t-value (15.85) is greater than the tabulated t-value (1.96), therefore leading to rejecting the null hypothesis and accepting the alternative hypothesis (Ha) that surports the determinants on Organization philosophy, Economy and Regulatory standards in KSA firms and organizations.

Table 6 shows the determinants of technology and continuous monitoring scaled on an ordinal measurement for appropriation in the results. The table interprets the statistical results regarding ideal determinants concerning the two groups, technological advancement and evaluating and monitoring. Determinants such as technological advancement, software and cloud computing with flexibility, and effectiveness and efficiency of firms are highly supported by respondents, as reflected in their responses to questions about technology. Questions coded by yes (1) and no (2) give a mean of 1.12, thus indicating firms and organizations are in the process of a revolution in e-audit risk, and it is suggested that the determinants be strategically evaluated in the future.

The determinants management to attain level of assurance, train audit team, reduce number of errors in operations and IT governance system are highly supported by respondents, as reflected in their responses to questions about continuous monitoring and evaluating. Those questions coded with yes/increase (1) and no/decrease (2) gave a mean of 1.13, thus indicating that firms and organizations are in the process of a revolution in e-audit risk and the determinants should be strategically evaluated in the future. However, the determinant reduce number of errors in operations had the highest mean (1.84), suggesting that innovations on audit risk through continuous monitoring must be planned strategically.

Table 6: *statistical results on ideal determinants of the two groups of e-audit risk revolutions in firms and organizations in KS.*

No.	Statement	Arithmetic mean	Standard deviation
	Technological determinants		
10	TAT - New technology system & trends enhanced the speed at which the goals and expectations achieved	1.09	0.284
11	FT - Software is flexible and customized widespread adoption of cloud computing	1.14	0.349
12	CCCS - Cloud computing and cyber security affecting e-audit risk	1.12	0.330
	Continuous monitor and evaluation determinants		
13	TMA - Management level of assurance increased since adopting e-auditing and accounting system	1.16	0.366
14	ATA - Audit team assurance to learn more about e-auditing and accounting system with your organization	1.12	0.330
15	OPC - Number of errors increased/decreased in operation process control since adopting e-auditing and accounting system	1.84	0.866
16	ITG - IT governance system is integrated with firm's e-audit risk management and monitoring.	1.09	0.284
	Average	1.223	

Table 7: *Second hypothesis test results*

Calculated t-value	Tabulated t-value	Significance	Result of H0	Mean
8.070	1.96	0.000	Reject	1.223

Table 7 shows the above calculated t-value (8.07) to be greater than the tabulated t-value (1.96), which enables the rejection of the null hypothesis and acceptance of the alternative hypothesis that the ideal determinants of the two groups, Technological advancement, and Evaluating and monitoring, KSA firms and organizations.

Table 8 analyzes the third study objective through descriptive statistics, which states to analyze the revolutionary confidence in risk assessment tools that covers technology obsolescence in KSA. The data collected are measured in terms of the proportion of the total sample size of 114 and ranked in terms of the opinions of the respondents. Data were collected on the basis of online and personal interviews. The study considers that obsolescence risk arises when a process is at risk of becoming outmoded, usually due to technological novelties. In fact, reducing obsolescence risk means enabling firms to get ready to make capital expenditures and investments in new technology and processes. To meet this objective, the study considers three phases: first to identify the challenges faced by the firms and organizations before introducing an e-auditing and accounting system, second the steps taken to improve the e-auditing and accounting system and third to identify the ideal features of an e-audit system.

Table 8: *an analysis of the revolutionary confidence in a risk assessment tool that covers technology obsolescence in KSA*

No.	Statement	Proportion (%)	Rank
P1	**Challenges faced before introducing e-auditing and accounting system**		
1.	Confusion among audit team	55.56	2
2.	Low quality assurance	53.70	3
3.	Rampant errors	57.41	1
4.	Prevalent omissions	51.85	4
5.	Missed deadlines	42.59	6
6.	Rampant mistakes	35.19	7
7.	Others	50.00	5
P2	**Steps taken to further improve e-auditing and accounting system**		
1.	Train employees on e-auditing and accounting system	85.19	1
2.	Risk elimination and control management system	51.85	5
3.	Have policies and regulations among the audit team	74.08	2
4.	Provide mentoring opportunities	59.26	3
5.	Feasible software	53.71	4
P3	**Ideal features in a revolutionary e-audit tool**		
1.	One that allows for planning and managing e-auditing and accounting procedures	87.04	1
2.	One that is easy to understand and use	79.63	2
3.	One that allows users to connect and store data in the cloud	68.52	3
4.	One that integrates well with other firms' tools	64.82	4.5
5.	One that is fully automated	55.56	6
6.	Others	64.82	4.5

Interpretation

Phase 1: In this phase, the study identified the challenges faced by accountants and auditors before introducing an e-auditing and accounting system. The variables considered were confusion among audit team, low quality assurance, rampant errors, prevalent omissions, missed deadlines, rampant mistakes and others. It was observed that most variables were considered highly acceptable, with only one or two percent difference in proportion, apart from the variable rampant mistakes which displayed the lowest proportion of 35.19%, and rampant errors which had the highest at 57.41%. Hence, it would be necessary for the e-audit tool to detect such errors and for the audit team to be vigilant. It observed that respondents are not clear on which areas are manual and which digital. Their responses indicated that manual and electronic processes are similar in risks, and that such risks inevitably exist. Variables may increase the emphasis in the events that they save time and effort for the auditor from doing a manual review or other only.

Phase 2: In this phase, the study identified steps for further improvements in e-systems through variables such as train employees, risk elimination and control management system, policies and regulations among the audit team, provide mentoring opportunities and feasible software. It was observed that most variables were highly acceptable, with proportions ranging from 85.19% to 51.85%. The variables risk elimination and control management system

displayed the lowest relative weight of 51.85% and the highest was observed for the variable rampant errors at 85.19%. Hence, support e-audit tool with such variable.

Phase 3: In this phase, the study identified ideal features in a revolutionary e-audit tool. Important variables considered were those that allow for planning and managing e-auditing and accounting procedures, that are easy to understand and use, that allow users to connect and store data in the cloud, that integrates well with other firms' tools, that is fully automated, and others. The study observed that most variables were highly acceptable with proportions ranging from 87.04% to 55.56%. The variable, one that is fully automated, had the lowest proportion of 55.56% and the variable with the highest was one that allows for planning and managing e-auditing and accounting procedures, at 87.04%. Hence, support e-audit tool with such variable.

Thus, it is suggested that for firms and organizations implementing revolutionary measures to cover the above variables, will have the capability to identify all types of risk in e-audit procedures and practices by the following recommended strategies.

Findings and summary

To summarize the findings of this study on e-audit research through a review of the literature spanning three decades, insights have been highlighted regarding advanced technology creating drastic changes in the business environment, thus affecting the audit profession with new tools for sophisticated professional procedures and practices. Challenging revolutions identified through the literature are duly acceptable by firms and organizations in KSA. Though firms and organizations in KSA are in the process of digitalization and the majority are using ERP and oracle software, many are looking forward to more feasible, effective and efficient tools with a strong acceptance for investments into data automation and analytics. This includes a focus on retention of employees and training facilities to improve professional services at a price that increases a firm's returns and profitability that matches the best cost benefit model. Firms are facing challenging standards both nationally and internationally to meet required compliances. Corporate governance systems that regularly and continuously monitor the accounting process brings effective success in digitalizing business environment adequately affecting audit profession. The following are common views of auditors found in KSA.

The manual and electronic processes are similar in risks, and they inevitably exist. They may increase the emphasis in the event that they save time and effort for the auditor from doing a manual review or other only.

Auditors of KSA remark that technology takes auditors away (distances them) from manual review and analytical matters and issues, away from linking systems and creative and critical thinking, because the program/software does it all automatically.

The risk of losing the paperwork exists, even for manual ones, but electronic paperwork has a higher risk of being lost, but their characteristics and advantages are much higher and better.

The more technology, the more complex the matter.

The auditor must keep pace with development and ensure that his work does not end with the existence of the system. On the contrary, the auditor used to enter data, but now he has more than one job and many tasks.

Reduced risk in decision-making has speeded up data access, increased productivity, and reduced costs in terms of paper archiving, etc.

Linking files to the Zakat and Income Authority in an easy and smooth manner. This link reduces visits between the client and the accountant.

E-audit has completely changed it and saves time, digitalization has changed the analysis procedures completely.

Electronic verification procedures will still exist but the data must continue verified in manual practice. There must be manual procedures.

Updates, cyber security, heavy data, privacy and resistance of using by some auditors also internal auditing must be locally done, not remotely.

The technology will take auditing to the next level, but there is not much trust on technology, the technology will take over the auditors themselves, auditors will not be able to audit because of the technology.

E-audit achievement will be high in the field of auditing, but there will be a challenge in training, qualifying and cooperating staff in learning on electronic programs.

E-audit risk measurement for each item is only on a few samples and is not on the entire data; it will change, not in a big way, but if there is a link between the systems completely, such as zakat and income, yes, there will be a big difference.

However, in spite of the above findings of auditors, it has been seen that automation in data analytics even if complicated can bring revolutionary action on the identified determinants that are challenging IT and the accounting profession, and requires additional research to minimize complications and be supported with recommendations to control risk.

Recommended automation in e-audit risk control

➢ Required high level of skill and knowledge in accounting to hedge accounting procedures that tend to be complicated.
➢ Automation of e-audit process with more substantive works to reduce audit risk to an acceptable level.
➢ Automation of e-audit process that identifies control risk as high when it is more effective to perform the test of detail rather than reliance on internal control.
➢ Automation of e-audit process to identify and mark inherent risk as high, moderate or low and perform more audit procedures to reduce the level of audit risk.
➢ Automation of e-audit process to assess inherent and control risk that enables appropriate planning on nature, timing and extent of the audit procedures. Detection risk is referred to as the relationship between the three components of audit risk, where usually auditors fail to detect material misstatements and have no basis for assessing the risk that exists on the financial statements.
➢ Thus, if automation in e-audit identifies that the level of inherent and control risk is low, then audit professionals can make an appropriate judgment that the level of audit risk is tolerably low, even where the detection risk can be higher. Automation can reduce their substantive work to control audit risk at a tolerable level.

Limitations

The study was limited to considering firms and organizations in Riyadh, KSA. The study was limited to exploring the determinants identified but could be scaled up to consider many more. The study was subject to descriptive statistics and the data could be analyzed using a more advanced research methodology. The items reflecting revolutionary confidence in risk assessment tools that concern technology obsolescence were limited to a set of variables whereby many more characters could be added for further research.

Conclusion

In conclusion, the study identifies that manual systems are required alongside digital systems so that auditors can verify the two methods in order to be confident and assured that the advanced technology is effective. However, auditors must keep pace with development and be aware that their work does not end with the existence of the digital systems. This strongly supports the use of the tool recommended by the research of ABBYY (2019), flexi capture, which automatically identifies document types and improves images, data transfer from invoices, contracts and other structured and unstructured documents, and is much faster in extracting the required data and further transferring the data into a master spreadsheet than could be possible manually. When such automation has been made, the next step would be regarding automation to control e-audit risk. This would contribute towards being digital, innovative, embracing the advancement of technology and revolutionary challenges in the audit and accounting profession.

Data Availability

Data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

Authors declare that they have no conflicts of interest.

References

Abbyy, 2019. PwC efficiently automates financial document processing with ABBYY. Available: https://www.abbyy.com/enus/case-studies/pwc-efficiently-automates-financial-document-processing-with-abbyy/#sthash.g79OQuHI.dpbs. Retrieved: 2.3.2019

Ann C. Dzuranin, Irina Mal˘ Aesc (2016) The Current State And Future Direction Of IT Audit: Challenges And Opportunities Journal of Information Systems, American Accounting Association Vol. 30, No. 1 DOI: 10.2308/Isys-51315, Spring 2016, Pp. 7–20

Anas Abdelbagi Elamin (2020) Journal of Economic, Administrative and Legal Sciences Volume (4), Issue (6) : 30 June 2020 P: 1 - 16 ISSN: 2522-3372The effect of E-commerce on the audit profession

Abdulwahab Mujalli and Ahmed Almgrashi, (2020) A Conceptual Framework for Generalised Audit Software Adoption in Saudi Arabia by Government Internal Auditing Departments using an Integrated Institutional Theory-TOE Mode 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE) | 978-1-6654-1974-1/20/$31.00 ©2020 IEEE | DOI: 10.1109/CSDE50874.2020.9411556

Adrian Gepp, Martina K. Linnenluecke, Terrence J. O'Neill, Tom Smith (2018)

Ammar and Nadya (2020), The role of artificial intelligence techniques using digital auditing in achieving audit quality and supporting the audit strategy from the point of view of auditors (A field study in audit firms in the Kingdom of Bahrain)Global Journal of Economics and Business (GJEB) Journal Homepage:
https://www.refaad.com/views/GJEB/home.aspx ISSN: 2519-9293(Online) 2519-9285 (Print)

M. Rozario, A. Zhang, and M. A. Vasarhelyi, "Examining Automation in Audit | IFAC." [Online]. Available: http://www.ifac.org/knowledge-gateway/auditassurance/discussion/examining-automation-audit. [Accessed: 20- Nov-2019].

AICPA (2015) •American Institute of Certified Public Accountants (AICPA). 2015. Audit Data Standard Working Group. Available at:
http://www.aicpa.org/interestareas/frc/assuranceadvisoryservices/pages/auditdatastandardworkinggroup.aspx

Barta, G. (2018). The increasing role of IT auditors in financial audit: risks and intelligent answers. Business, Management and Education, 16, pp. 81-93.

Bizarro, P. A., & Dorian, M. (2017). Artificial Intelligence: The future of auditing. Internal Auditing, 32(5), pp. 21-26

Blockgeeks, 2019. What is blockchain technology? A step-by-step guide for beginners. Available: https://blockgeeks.com/guides/what-is-blockchain-technology/. Retrieved: 1.3.2019

Byrnes et al. (2018) Byrnes, P. E., Awadhi, A. A., Gullvist, B., Liburd, H. B., Teeter, R., Warren Jr., D. J., & Vasarhelyi, M. (2018). Evolution of Auditing: From the Traditional Approach to the Future Audit. Continuous Auditing, pp. 285-297

Bhaskar Chavali, Sunil Kumar Khatri Syed Akhter Hossain (2020) 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO) Amity University, Noida, India. June 4-5, 2020

Chan and Vasarhelyi (2011 . Innovation and Practice of Continuous Auditing. International Journal of Accounting Information Systems, Vol. 12, Issue 2, June, pp. 152-160

Chou, C. and Janie Chang, C. (2010), "Continuous auditing for web-released financial information", Review of Accounting and Finance, Vol. 9 No. 1, pp. 4-32. https://doi.org/10.1108/14757701011019790 Publisher : Emerald Group Publishing Limited Copyright © 2010, Emerald Group Publishing Limited

Chou, D. C. (2015). Cloud computing risk and audit issues. Computer Standards & Interfaces, 42, pp. 137-142.

Daugherty, P. R., & Wilson, H. J. (2018). Human+ machine: reimagining work in the age of AI. Harvard Business Press. Deloitte (2019). Blockchain Lab. Available: https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/Technology/IE_C_BlockchainLab_210mmx210mm_0117.pd f Retrieved: 1.3.2019

Dzuranin, A. C., & Malaescu, I. (2016). The current state and future direction of IT audit: challenges and opportunitites. Journal of Information Systems, 30(1), pp. 7-14

Deloitte,(2016) "Deloitte Forms Alliance with Kira Systems to Drive the Adoption of Artificial Intelligence in the Workplace." [Online]. Available: https://www.prnewswire.com/news-releases/deloitte   forms-alliance-with-kira-systems-to-drive-the-adoption-of-artificial intelligence-in-the-workplace-300232454.html. [Accessed: 25-Nov 2019].

D. Faggella, "AI in the Accounting Big Four – Comparing Deloitte, PwC, KPMG, and EY," Emerj, 2019. [Online]. Available: https://emerj.com/ai-sector-overviews/ai-in-the-accounting-big-fourcomparing-deloitte-pwc-kpmg-and-ey/. [Accessed: 25-Nov-2019].

Deloitte, "The new physics of financial services: How artificial intelligence is transforming the financial ecosystem," 2018. [Online]. Available:

EY,(2019) "Why success with AI in the audit starts with asking the right questions," 2019. [Online]. Available: https://www.ey.com/en_gl/assurance/why-success-ai-audit-startswith-asking-right-questions. [Accessed: 25-Nov-2019].

Forbes (2018). The Digital Transformation of Accounting and Finance - Artificial Intelligence, Robots and Chatbots. Available:
https://www.forbes.com/sites/bernardmarr/2018/06/01/the-digital-transformation-of-accounting-and-finance-artificialintelligence-robots-and-chatbots/#463edabe4ad8
Retrieved: 27.2.2019

KPMG, "KPMG Ignite," 2018. [Online]. Available:
https://assets.kpmg/content/dam/kpmg/uk/pdf/2018/09/kpmgignite.pdf. [Accessed: 25-Nov-2019].

KPMG, "KPMG Intelligent Underwriting Engine," 2018. [Online]. Available:
https://assets.kpmg/content/dam/kpmg/xx/pdf/2018/03/kpmgintelligent-underwriting-engine.pdf. [Accessed: 25-Nov-2019].

KPMG, "KPMG Sales Intelligence Engine," 2018. [Online]. Available:
https://assets.kpmg/content/dam/kpmg/xx/pdf/2018/03/kpmg-salesintelligence-engine.pdf. [Accessed: 25-Nov-2019].

H. Issa, Ting Sun, and M. A. Vasarhelyi,(2016) "Research Ideas for Artificial Intelligence in Auditing: The Formalization of Audit and Workforce Supplementation.," J. Emerg. Technol. Account., vol. 13, no. 2, pp. 1– 20, 2016

Ing. Aneta Zemankova (2019) International Conference on Control, Artificial Intelligence, Robotics & Optimization (ICCAIRO 978-1-7281-3572-4/19/$31.00 ©201 IEEE DOI 10.1109/ICCAIRO47923.2019.00031

K. M. Ziaullah, (2017) "IT Security and Information System Audit in Banks," Fintech: Technology, Business, Innovation, vol. 5, pp. 45-52, 2017.

Mesa, B. Hartono, and J. F. Andry, (2018) "Evaluation of Information System Effectiveness Level Using COBIT Framework 5," Cogito Smart Journal, vol. 4, pp. 148-159, 2018.

Marr, B. (2018). What is industry 4.0? Here´s A super easy explanation for anyone. Published: 2.9.2018. Available: https://www.forbes.com/sites/bernardmarr/2018/09/02/what-is-industry-4-0-heres-a-super-easy-explanation-foranyone/#1cdcbe8c9788   Retrieved: 15.2.2019

Mills, T. (2019). Four Natural Language Processing Techniques to Increase Your Understanding. Forbes. Available:
https://www.forbes.com/sites/forbestechcouncil/2019/01/31/four-natural-language-processing-techniques-to-increase-yourunderstanding/#bc133b658940   Retrieved: 1.3.2019

Mona de Boer, Peter Eimers and Philip Elsas (2014), Submitted to the International Symposium on Audit Research 2014 at Amsterdam Research Center in Accounting (ARCA) at VU University Amsterdam and senior manager at PwC Netherlands,

Peter W.A. Eimers is professor of Auditing at VU University Amsterdam, partner at PwC Netherlands and chairman of the Dutch Ethics & Assurance Standards Board at NBA, Philip Elsas is director at ComputationalAuditing.com.

Pathak, J., B. Chaouch, and R. S. Sriram. 2005. Minimizing cost of continuous audit: Counting and time dependent strategies. Journal of Accounting and Public Policy 24 (1): 61–75.

Pathak, J., S. Nkurunziza, and S. E. Ahmed. 2007. General theory of cost minimization strategies of continuous audit of databases. Journal of Accounting and Public Policy 26 (5): 621–633

M. R. Pribadi,(2016) "Penerapan Tata Kelola Teknologi Informasi dengan Menggunakan COBIT Framework 4.1 (Studi Kasus Pada RSUD Bari Palembang)," Jurnal Eksplora Informatika, vol. 4, pp. 115-124, 2016.

Onyshkevych, B. (2018). Deep Exploration and Filtering of Text (DEFT). DARPA. Defense Advanced Research Projects Agency. Available: https://www.darpa.mil/program/deep-exploration-and-filtering-of-text Retrieved: 1.3.2019

PricewaterhouseCoopers, "Harnessing the power of AI to transform the detection of fraud and error," PwC, 2019. [Online]. Available: https://www.pwc.com/gx/en/about/stories-from-across-theworld/harnessing-the-power-of-ai-to-transform-the-detection-offraud-and-error.html. [Accessed: 25-Nov-2019].

PricewaterhouseCoopers, "PwC wins Audit Innovation of the Year award with its pioneering AI technology," PwC, 2019. [Online]. Available: https://www.pwc.com/gx/en/news-room/pressreleases/2019/audit-innovation-of-the-year-2019.html. [Accessed: 25-Nov-2019].

Potla, L. 2003. Detecting accounts payable abuse through continuous auditing. IT Audit 6. Rezaee, Z., W. Ford, and R. Elam. 2000. Real-time accounting systems. Internal Auditor 57 (2): 62.

Rezaee, Z., A. Sharbatoghlie, R. Elam, and P. L. McMickle. 2002. Continuous auditing: Building automated auditing capability. Auditing: A Journal of Practice & Theory 21 (1): 147–163

R. Manita, et al. (2020)The digital transformation of external audit and its impact on corporate governance Riadh Manitaa , Najoua Elommalb , Patricia Baudierc , Lubica Hikkerovad,∗ Technological Forecasting & Social Change journal homepage: www.elsevier.com/locate/techfore

Rongxu Liu, (2020) International Conference on Computer Communication and Network Security (CCNS) Applications of New Technologies to Recognition of Financial Statement Fraud Year: 2020, Volume: 1, Pages: 22-25 DOI Bookmark: 10.1109/CCNS50731.2020.00013

SEC (2015) Securities and Exchange Commission (SEC). 2015. Cybersecurity Examination Sweep Summary. Available at: http://www.sec.gov/about/ offices/ocie/cybersecurity-examination-sweep-summary.pdf

Shawnie Kruskopf, et. al (2020), Digital Accounting and the Human Factor: Theory and Practice Shawnie Kruskopf, Charlotta Lobbas, Hanna Meinander, Kira Söderling, Minna Martikainen, Othmar Lehner* ACRN Journal of Finance and Risk Perspectives 9 (2020) 78-89. journal homepage: http://www.acrn-journals.eu/

Shi-Cho Cha and Kuo-Hui Ye (2018) An ISO/IEC 15408-2 Compliant Security Auditing System with Blockchain Technology, 2018 IEEE Conference on Communications and Network Security (CNS): IEEE CNS 2018 – Posters 978-1-5386-4586-4/18/$31.00 ©2018 IEE

Thottoli, M.M. and K.V., Thomas. (2020), "Characteristics of information communication technology and audit practices: evidence from India", VINE Journal of Information and Knowledge Management Systems, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/VJIKMS-04-2020-0068

Thomas, J. (2018). EY announces blockchain audit technology. Available: https://www.ey.com/en_gl/news/2018/04/eyannounces-blockchain-audit-technology Retrieved: 27.2.2019

Vasarhelyi, M. , J. Warren, R Teeter and W.R.. Titera, 2014. Embracing the automated audit - How the Audit Data Standards and audit tools can enhance auditor judgment and assurance, Journal of Accountancy, April
 http://www.journalofaccountancy.com/issues/2014/apr/automated-audits-2012703921

Zhang, Chanyuan., Dai, Jun., Vasarhelyi, Miklos A. (2018). The Impact of Disruptive Technologies on Accounting and Auditing Education. CPA Journal, 88(9), 20-26.

Zhang Xing, Zhang Lijun, Li Zhu (2020) A Study on the Application of the Technology of Big Data and Artificial Intelligence to Audit 2020 International Conference on Computer Engineering and Application (ICCEA) 978-1-7281-5904-1/20/$31.00 ©2020 IEEE DOI 10.1109/ICCEA50009.2020.00174

Websites

COBIT (2019) Information Systems Audit and Control Association (ISACA) COBIT (Control Objectives for Information and Related Technologies) https://www.isaca.org/resources/cobit

https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/finan cial-services/deloitte-uk-world-economic-forum-artificialintelligence-summary-report.pdf. [Accessed: 25-Nov-2019]