

AUDITOR COMPETENCE IN DIGITAL-BASED GOVERNMENT ORGANIZATIONS: SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

This research focuses on auditor competencies that government organizations can use in the digital age. This study explains how to look into auditor competency in government organizations in this digital age. It also looks at the focus and criticisms of previous research on this subject and suggests possible directions for future research on auditor competency in these organizations. We conducted a structured literature review for governments in English, specifically focusing on auditor competency in digitally based government organizations. The results show a growth in the number of governments related to auditor competency in digital-based government organizations over the last ten years. However, organizational culture, as well as organizational and environmental factors, can influence the assessment of auditor competency indicators, which does not automatically imply all the factors that influence an auditor's competency. As accounting information continues to change along with technological development, guidance on competency becomes dynamic. As a result, assessing auditor competency is a critical component of improving audit quality. Researchers often study information technology competency, problem-solving skills, analysis, and data literacy, but there is no evidence indicating which competency is the most dominant. This research's limitations primarily stem from the influence of recent findings on future research directions. Therefore, it's possible that the picture remains incomplete due to the uncertainty surrounding the pace of technological evolution. Government organizations can use this article, which focuses on aspects of auditor competency assessment that emphasize technological developments.

Keywords: data analysis, technology competency, data literacy, government auditor

Penelitian ini berfokus pada kompetensi auditor yang dapat digunakan oleh organisasi publik di era digital. Penelitian ini menjelaskan bagaimana penelitian kompetensi auditor di organisasi publik dalam era digitalisasi, menyelidiki apa fokus dan kritik literatur tentang kompetensi auditor di organisasi publik dalam era digitalisasi, dan mengembangkan penelitian masa depan terkait dengan kompetensi auditor di organisasi publik dalam era digitalisasi. Tinjauan literatur terstruktur dilakukan untuk publikasi dalam bahasa Inggris tentang kompetensi auditor dalam organisasi publik yang berbasis digital. Hasil mengungkapkan bahwa jumlah publikasi yang berhubungan dengan kompetensi auditor dalam organisasi publik berbasis digital mengalami perkembangan selama sepuluh tahun terakhir. Namun, penilaian indikator kompetensi auditor secara otomatis tidak menyiratkan keseluruhan dari faktor-faktor yang memengaruhi kompetensi seorang auditor, karena penilaian indikator kompetensi auditor bisa dipengaruhi oleh budaya organisasi, dan faktor organisasi dan lingkungan. Panduan tentang kompetensi menjadi dinamis karena informasi akuntansi terus berubah disertai dengan perkembangan teknologi. Jadi, penilaian kompetensi auditor menjadi komponen penting untuk meningkatkan kualitas audit. Tidak ada bukti yang menyatakan kompetensi mana yang paling dominan, meskipun kompetensi teknologi informasi dan keterampilan pemecahan masalah atau analisis dan literasi data merupakan kompetensi yang sering diteliti oleh para peneliti. Penelitian ini memiliki keterbatasan, yaitu arah penelitian masa depan berasal dari penelitian terbaru. Sehingga, mungkin saja masih jauh dari gambaran utuh karena belum ada yang tahu kecepatan evolusi teknologi. Artikel ini berfokus pada aspek penilaian kompetensi auditor yang dapat digunakan oleh organisasi publik, yang ditekankan adanya perkembangan teknologi.

Kata kunci: analisis data, kompetensi teknologi, literasi data, auditor publik

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Academia, industry, and government are spending a lot of time paying attention to

digital technology, like blockchain, artificial intelligence, big data, the Internet of Things (IoT), and cloud computing. These

innovations profoundly transform organizations and individuals (Benlian, Kettinger, Sunyaev & Winkler, 2018). Innovation in the audit field. Audit digitalization aims to increase the efficiency and effectiveness of audits in the future (Han, Rezaee, Xue & Zhang, 2016; Hay & Cordery, 2021; Lombardi, Bloch & Vasarhelyi, 2015). Government organizations digitize audits as part of their digital transformation process, enabling them to assist in making audit decisions. Government organizations digitize audits as part of their digital transformation process, enabling them to assist in audit decisions (Bonsón & Bednárová, 2019; Schmitz & Leoni, 2019). Audit transformation has changed the audit process from traditional auditing to continuous auditing (Antonio, 2014). Audit transformation is identical to the audit process using information technology (IT) (Tarek, Mohamed, Hussain & Basuony, 2017). Audit transformation has an impact on the application of expert systems (Noviari, 2007).

Developing countries have implemented digital-based government organization audit services, such as Botswana's 2004 implementation of the Government Accounting and Budgeting System (GABS), which aims to improve financial management processes and expenditure reporting based on digital records (Mosweu & Ngoepe, 2019). According to Mosweu & Ngoepe (2019), digital recording aids the audit process, necessitating auditors to possess the necessary skills and knowledge in system IT. Carroll (2006) emphasizes the importance of accounting and reporting in process audits. In 2011, the Indonesian government began using big data by developing an e-audit system for supervision (BPK-RI, 2011). However, the government will make efforts in 2020-2024 to develop big data analytics for managing and using state assets through financial audits, performance audits, and audits with objective certainty (Plan Strategic BPK-RI, 2020-2024). BPK-RI is actively developing and utilizing big data analytics, also known as BIDICS, to prepare for the upcoming

industry revolution 4.0. We must adjust to the swift advancement of information technology (IT) (BPK-RI, 2022).

Digitalization has had a major impact on the labor market (Dengler & Matthes, 2018) and is changing business practices in all industries, including audit processes. We can identify a consensus on digitalization's impact on organizations and employee activities (Dumitru, 2016). The audit process is currently at a crossroads; companies need to adapt their strategies as digitalization changes the way they conduct audits (Manita, Elommal, Baudier & Hikkerova, 2020) For decades, traditional audit methods have been useful to auditors, but as technology has changed and stakeholder expectations have evolved, auditors need to adapt and change methodologies to meet the demands placed on them (World Bank, 2017).

Technological digitalization is synonymous with datafication (Redden, 2018). Governments have not been able to escape the digital wave, and they are using digital technologies, social media, algorithms, and artificial intelligence at different levels and in different ways to improve government services and find new ways to connect with citizens (Alathur Ilavarasan & Gupta, 2012; Charalabidis & Loukis, 2012; Munteanu & Newcomer, 2020). Alathur et al. (2012) expect this trend to persist. The World Economic Forum (2020) predicts that the increasing division of labor between humans and machines will result in the loss of approximately 85 million jobs by 2025. Thus, fundamental competencies for stress management will protect and prevent crossing the threshold from stress to stress. According to Iglesias (2006), competence can be defined as achievement in an activity or social ability.

Several previous research results discuss the relationship between auditor competency and curriculum, aiming to synchronize education and practice (Al-Tamimi, 2021; Coyne, Coyne & Walker, 2016; Palmer, Ziegenfuss & Pinsker, 2004). Additionally, they discuss the role of auditor competency in the company's work environment (Alsabahi, Bahador & Saat,

2021; Stoel & Havelka, 2021; Vasarhelyi & Romero, 2014). Synchronization between education and practice can make it easier for students to become auditors because the curriculum is adjusted to technological developments equipped with digital-based audit techniques. The aim is to provide system-based audit training or practice so that students have technology-based competencies and skills before entering the work world. Information technology competency can help auditors survive when technological advancements occur. Despite the extensive research on competency, there are still opportunities to conduct research through systematic literature reviews (SLRs). We conducted SLR research to identify the issues facing governments and their organizations in both developed and developing nations, with a particular focus on the auditors' competency in the digital era. In the era of Industrial Revolution 4.0, the expectation is for auditors in government organizations to possess data analytical skills (Jaffar, Ahmad & Sulaiman, 2022). This research aims to investigate the competence of auditors in government organizations during the digitalization era. What is the focus and criticism of the literature on auditor competency in government organizations in the era of digitalization? And what future research will there be on auditor competency in government organizations in the era of digitalization? Therefore, it is necessary to conduct additional research on the competencies of auditors in the digitalization era, particularly within government organizations. This article conducts a structured literature review to delve deeper into this issue, adhering to Massaro, Dumay & Guthrie (2016)'s proposed methodology.

RESEARCH METHODS

This section explains the research process and search strategy for the structured literature review used in this research. A structured literature review, a type of systematic review, facilitates retrieval and collection through a determined, limited, and transparent methodology. It gives a clear synthesis and assessment of the

existing literature and its main findings on a particular topic (Santis, Grossi, & Bisogno, 2018). Structured literature reviews are better than meta-analyses or other types of systematic reviews for combining results from contributions based on non-experimental protocols or a small number of in-depth studies (Massaro et al., 2016). The aim is to (1) investigate the development of literature on auditor competency in government organizations; (2) develop a reading of the literature on auditor competency in government organizations; and (3) offer suggestions for future research and policy agendas.

The funnel method, which developed this research's search strategy, starts with an extensive search to cover all potentially relevant contributions, followed by a limited selection (Santis et al., 2018). The research process consists of the following steps: The first step involves identifying the study topic, specifically the competency of government auditors. The second step involves identifying the research objectives and questions that this literature review will address. As previously stated, the purpose of this research is to understand how far current research has progressed as well as identify avenues for future research. The third step is to gather articles from databases Scopus for review.

The terms auditor competency *, skills *, and knowledge * searched in the title or keywords. We use the asterisk symbol (*) at the end of each second to guarantee that each article's variation is unique. We conduct this study using all annually published articles and any journal within the Business, Management, and Accounting categories, provided they contain search results from the Scopus database. However, to ensure a comprehensive portrayal of the subject matter, we also conducted a search for the following keywords in the Accounting and Auditing journal category: auditor skill*, compliance*, external auditors*, government auditor* , auditor knowledge *, technology readiness* , external auditors*, and knowledge auditors* .

From these sources, you can find

relevant government organizations. The submission of scientific work is unrestricted by domain or scientific field, but all articles must focus on auditor competency indicators and be fully searchable online in English. The database, sourced from Scopus, produced 42 articles out of a total of 90 search results (Figure 1). The research concentrated on tabulating abstracts and categorizing them into three groups: (1) the primary focus on auditor competency in government organizations; (2) references solely to the competency of auditors in government organizations or general issues related to auditor competency; and (3) no mention of the competency of auditors in government organizations.

Literature Impact

Impact from government organizations which chosen related with step fourth in Systematic literature review is a verification process through the accuracy of government organizations and the

influence of various sources or references used to obtain information. The number of citations for each article was used as a proxy for its relevance and quality for help contribution in show debate academic (Massaro et al., 2016). Table 1 shows the top ten governmentations selected by number of citations as of January 2023.

As explained in Table 1, the five most frequently cited research articles are Ahmi & Kent (2012), Schmitz and Leoni (2019), Palmer, Ziegenfuss, and Pinsker (2004), Al-Htaybat, Alberti-Alhtaybat & Alhatabat (2018), & Bonsón & Bednárová (2019). This indicates that the research contributions from Ahmi & Kent (2012) and Palmer, Ziegenfuss, & Pinsker (2004) have had a lasting impact on subsequent studies. Palmer, Ziegenfuss, and Pinsker (2004) serve as a foundation for research on knowledge, skills, and abilities by incorporating several established government organizations like Bremser (1977) and Roy & MacNeil (1967). These organizations emphasize the importance of

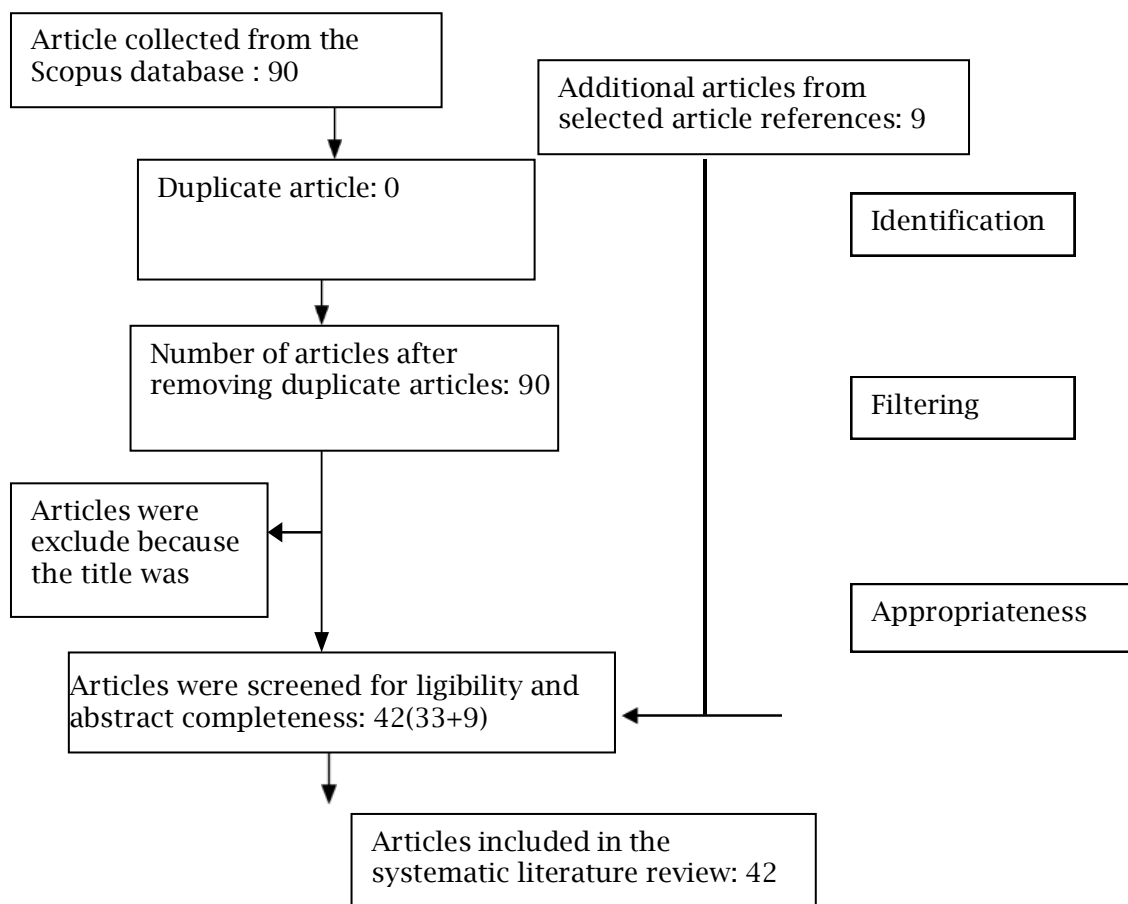


Figure 1. Process Search Literature, adopted from (Silvia Iacuzzi , 2021).

knowledge comprehension for face-to-face career accounting professionals, and their research findings provide a range of understandings necessary for delivering optimal services and fostering innovative ideas in line with current advancements. They also use research methodologies that can produce additional sets of knowledge indicators.

Schmitz & Leoni (2019); Al-Htaybat et al. (2018), and Bonsón & Bednárová (2019) provide results, findings, and knowledge that appear because of digital transformation. Schmitz & Leoni (2019)

explain that blockchain can automate various audit tasks, thereby having an impact on the audit profession. Auditors must expand their skills and knowledge (Schmitz & Leoni, 2019). Technological advancements impact the auditor's competency development process, making these competency indicators crucial, as elaborated in the section on the suggested dimensions of competency indicators.

Framework analysis

The first step involved reading the ten most cited articles from the chosen

Table 1.
The Top Ten Governments Selected Based on the Number of Citations as of January 2023

No	Author	Heading	Quartile	Journal	Year	Citation
1	Ahmi, A., & Kent, S	Utilization of general audit software (GAS) by external auditors	Q1	Journal of Managerial Audit	2013	143
2	Schmitz, J., & Leoni, G.	Accounting and auditing at the time of blockchain technology: Research Agenda	Q1	International Journal of Accounting Information Systems	2019	107
3	Palmer K.N., Ziegenfuss D.E., Pinsker R.E.	International knowledge, skills, and abilities of auditors/accountant: Evidence from recent competency studies.	Q1	Journal of Managerial Audit	2004	72
4	Al-Htaybat, K., & Alberti-althaybat, L. Von.	Big Data and corporate reporting: Impact and paradox	Q1	Accounting, Audit & Accountability Journal	2017	68
5	Bonsón, E., & Bednárová, M.	Blockchain and its implications for accounting and auditing	Q1	Meditari Accounting Research	2019	61
6	Siew, E.G., Rosli, K., & Yeow, P.H.P	Organizational and environmental influences in adoption computer-aided auditing tools and techniques (CAATT) by audit firms in Malaysia	Q1	International Journal of Accounting Information System	2020	55
7	Pollack, J., Helm, J., & Adler,	What is the Iron Triangle, and How it changed	Q2	International Journal of Managing	2018	49
8	Dzurainin, A.C., Jones, J.R., & Olvera, R.M	Embedding data analysis into the accounting curriculum: A Frameworks and insights from faculty	Q1	Journal of Accounting Education	2018	47
9	Flowerday, S., Blundell, A.W., & Von Solms, R	Continuous audit Technologies and models: Discussion	Q1	Computer & Security	2006	36
10	Boritz J.E., Hayes L., Lim J.-H.	Content analysis of auditors' reports on IT internal control weaknesses: Comparative advantages of an automated approach to control identification of weaknesses	Q1	International Journal of Accounting Information Systems	2013	34

government organizations, followed by a systematic discussion of the literature review development process. The framework is summarized in Table 2 and 3, and arranged into three analysis groups:

We use framework research to investigate development literature over time, adhering to a systematic literature review that solely includes government organizations. We conducted design studies to understand how studies about competence auditors in government organizations during the digitalization era have evolved into two distinct categories. We first adopted and modified the category from a previous study (Alsbahi et al., 2021; Palmer et al., 2004), which focused on the research method and the utilization of existing competency indicators. The second category is the formation of clusters based on "Competency Development". We developed the

competency development cluster as a new category to assist in determining whether government organizations discuss competency indicators or merely apply them. The topic remains unexplored. The new development category will display the acceptance level of a specific indicator.

The research focused on analyzing the existing research topics and limitations in the literature. For instance, Schmitz & Leoni (2019) argue that to stay at the forefront, accountants and auditors must overcome their limitations by gaining a thorough understanding of technologies such as blockchain. Because of that, the focus of the research was on grouping audit competencies that can be used by government organizations, which are presented in two categories (Table 3), namely "Competency Indicators", which can provide information related to the required competencies for auditors And "Objective

Table 2.
Research Time Frame and Design

	Government Organization	%
(a) Year Government organization		
1999 - 2010	4	9.52
2011 - 2014	5	35.71
2015 - 2018	14	33.33
2019 - 2022	19	45.22
Entire	42	100
(b) Method Study		
Archives	2	5
Surveys	14	33
Model Mathematics	1	2
Descriptive	2	5
Studies Case	1	2
Interpretative	2	5
Interview Interview	3	7
And Literature	2	5
Review Survey	5	12
Conceptual Content	1	2
Analysis Articles	1	2
No State in a way explicit Total	8	19
Articles	42	100
(c) Cluster Development Competence		
	Government organization	%
Development evaluation auditor competency that can be used by the government organization	7	17
Application development directly from the auditor's competency can used in government organizations	35	83
Total	42	100

use indicators", which help estimate the use of these indicators.

Reliability, coding and validity

Reliability in recording and analyzing data is ensured through several methods (Massaro et al., 2016), namely by selecting dimensions and categories from relevant literature, and building reliable coding instruments with well-defined categories and rules. First, code the most cited articles independently to assess the reliability of the adopted framework and identify any nonconformities. Validity is measured using different means. "Pattern matching" and "explanation building" (Yin, 2014) make sure that the research is internally valid. Massaro et al. (2016) accomplish this by first analyzing the most-cited articles and then using a larger sample to test the initial conclusions. The goal is to find causal relationships. Yin (2014) first examines the results by comparing explanations, logical models, and triangulation in small groups of articles, followed by an analysis of the entire data set that compares the number of articles and the impact of citations. External validity explains the results' generalizability by demonstrating how well

the chosen article fits into the existing literature and confirming that past theories or studies can explain the results (Massaro et al., 2016; Yin, 2014). Massaro et al. (2016) carry out construct validity, which involves ensuring that operational actions are appropriate for the concept under study, using various sources to support the results.

ANALYSIS AND DISCUSSIONS

Literature auditor competency indicator

We test indicators of auditor competency to shed light on the essential skills and knowledge required in the digitalization era. The aim is to increase efficiency and effectiveness, audit quality, transparency, readiness to use information technology and adopt technological innovation, and prepare a generation of professionally qualified accountants and auditors.

Research timeframes

Among the selected literature, the 1990s were the beginning of studying the importance of accounting practices and identifying the competencies needed as a professional auditor so as to analyze audit processes such as, privatization of state-owned companies and government utilities

Table 3.
Focus Study

Indicators	Government organizations	%
a) Indicator Auditor Competency		
Competence General:		
Skills communication	10	24
Skills computer	10	24
Information Technology	24	57
Knowledge Business General	8	19
Knowledge Article Total Accounting	9	21
Competence Special:	42	145
Problem Solving / Data Analysis / Data Literacy Skills	22	52
Skills Interpersonal	7	17
Attitude And Ability Personal	7	17
Total Article	42	86
(b) Purpose of Using Indicators		
User Readiness Level Preparing	23	5
quality auditors	5	12
Transparency	4	10
Effectiveness	3	7
Quality Auditing	3	7
Opinion	2	5
Timeliness	1	2
Performance	1	2
Total article	42	100

(Torres & Pina, 1999), while most contribution results studied rose in the final decade of 1991-2010 (not enough from 15%), 2011-2014 (not enough from 45%), and 2015-2022 (more than 50%) (Table 2). The government's implementation of several articles on auditor competency aligns with the digital transformation of the Industrial Revolution 4.0 era (Figure 2). According to Stoel & Havelka (2021), interest in auditing has been growing. The emergence of competence coincided with the advancement of technological developments, which in turn presented a variety of risks. As a result, research on auditor competency in the digital age provides opportunities for governments.

Design study

The research design aids in assessing probability using various methods and

theories, enabling us to determine if the contribution aims to create and implement a new framework or enhance an already established one. The research design may explain why there is a risk of "under-theorized empirics" (study empirical without base theoretical, conceptualization theoretical without support empirical) or "disembedded theory" (with A little, If There is, proof supporter) in the article (Enrico, Papa, Bigoni, Gagliardo & Bruns, 2019).

The selected government organizations were 42 articles (Table 2) using various research methods. Researchers often use the survey research method (14 of 42, Table 2) to address research variables, including questions related to auditor competency. The government organization of this article aims, among other things, to determine the level of technological readiness (Ahmi &

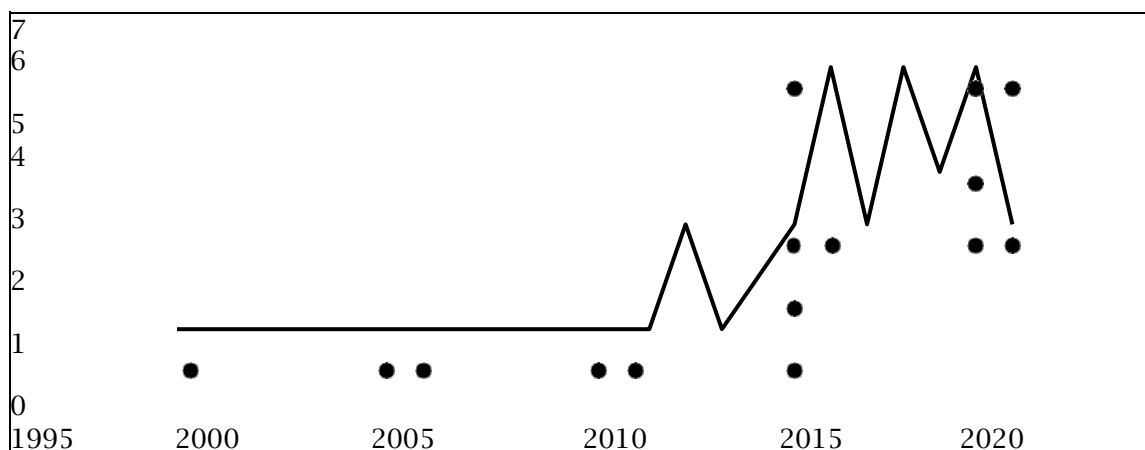


Figure 2.
Graphics Article Publication

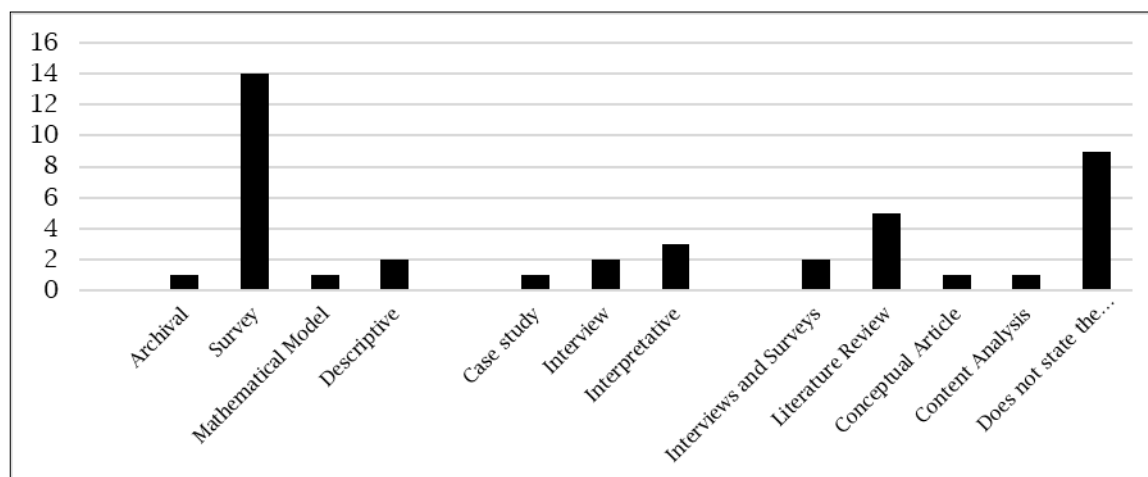


Figure 3.
Methodology Study

Kent, 2012; Dzurainin, Jones & Olvera, 2018; Jaffar et al., 2022; Vasarhelyi & Romero, 2014), the skills that influence competence in technology information (Alsabahi et al., 2021; Cooper, Leung, Dellaportas, Burnaby & Hass, 2009; Nazri, Rasib & Zolkifli, 2019; Siew, Rosli & Yeow, 2020; Tarek et al., 2017; Wu, Huang, Huang & Yen, 2017).

While many articles (8 out of 42, Table 2) provide details about the research methodology, this particular article focuses solely on the demographics of respondents and the analysis of techniques. Find out how important problem-related technology information is in quality audit (Flowerday, Blundell & Von Solms, 2006; Mock, Ragothaman & Srivastava, 2018; Stoel & Havelka, 2021), how well activities work (Han et al., 2016), how ready people are for technological modernization (Coyne et al., 2016), and audit opinions that say they used information technology, like the use of big data (Brown-Liburd & Wright, 2011).

The choice of research methodology in a government article can explain the research "Competency Development Cluster", whether the government discusses competency indicators or simply applies existing competency indicators without any discussion, which will indicate the level of acceptance of certain indicators. The literature review of 42 articles for orientation showed that 7 of them (table 2) looked at how to develop indicators of auditor competency, while 35 of them (table 2) used direct indicators of existing auditor competency.

Orientation evaluation development indicator competence auditors started from Palmer research et al. (2004), which discuss related competence auditors, which are assessed from general skills and specific skills. However, a global view of the audit profession requires understanding through the Common Body of Knowledge (CBOOK) (Cooper et al., 2009). Furthermore, the rapidly evolving field of information technology necessitates a curriculum that adheres to strict standards for evaluating auditor competency (Al-Tamimi, 2021; Dzurainin et al., 2018). Therefore, it's critical to consider

curriculum adoption and audit professional competency requirements when evaluating the development of audit competency indicators. But governments usually rely on existing auditor competency indicators. These are based on development process auditing using computer-assisted tools and techniques (Ahmi & Kent, 2012; Siew et al., 2020), as well as how technology trends change over time (Al-Htaybat et al., 2018; Christea, 2020; Stoel & Havelka, 2021; Tarek et al., 2017).

Critical reflection focuses on audit competency indicators in government organizations. A critical analysis of the literature reveals the development of a large indicator for both educators and practitioners (Palmer et al., 2004). Furthermore, it is important to design the competence indicators in a way that aligns with standard education and development technology. Al-Tamimi (2021) stated that they use electronic media learning for content delivery and auditing to adhere to standard education. Al-Tamimi (2021) prepares the generation process to ensure quality. Several studies highlight the need for development competence in technology (Bonson & Bednárová, 2019; Jaffar et al., 2022; Mosweu & Ngoepe, 2019; Supriadi, Mulyani, Soepardi & Farida, 2019) (Al-Tamimi, 2021). We conducted a critical analytical study to understand the rationale behind government organizations' use of competency indicators. Critical analysis in systematic literature reviews uses dimensions developed by Palmer et al. (2004). Palmer et al. (2004) used general competency indicators and specific competency-based knowledge, skills, and abilities (KSA).

Competence Auditor Indicator

The indicators used in most of the selected governments use general competencies (communication skills, computer skills, information technology, general knowledge, and accounting knowledge) and auditor-specific competencies (problem solving skills/data analysis/data literacy, interpersonal skills, attitudes, and personal abilities) (Table 3a). Palmer et al. (2004) found that the process of assessing auditor

competency can begin with these similarities. However, research by Palmer et.al (2004) does not criticize that the proposed professional competency assessment standards need to explain assessment tools. Which is appropriate, because educators and accountants need notice, which is needed by the auditing profession. The International Federation of Accountants (IFAC) criticized the assessment tools used as not its responsibility, but rather the responsibility of its members. Thus, the potential for administering different types of assessments internationally is real.

On the other hand, assessing auditor competency indicators automatically does not imply all of the factors that influence an auditor's competency, because assessing auditor competency indicators can be influenced by organizational culture (Alsabahi et al., 2021), and organizational and environmental factors (Siew et al., 2020). Although government entities use the AICPA for auditor competency (Palmer et al., 2004), the American Institute of Certified Government Accountants (AICPA) primarily developed guidance resources that focused on competence. Which expected all students to enter a profession regardless of where they will work (government/industry/government/non-profit) (Palmer et al., 2004). During its development, researchers employed various competency indicators to adjust to technological advancements, including Supriadi's (2019) use of personality and behavior, soft skills, and hard skills. Guide about competence becoming dynamic. Information accounting is constantly evolving due to technological advancements. Therefore, evaluating auditor competency plays a crucial role in enhancing audit quality by evaluating indicators, categorized into general and specific competencies, as explained below:

The selected literature confirms that conditional multi-indicators are necessary for measuring and assessing auditor competence, a requirement that many countries have recently adopted. This set of competency requirements stands alone (Palmer et al., 2004). For example, in

Canada, Chartered Accountants of Canada (CICA) makes maps of competence for paraprofessionals and candidate accountants. For, those who want to take the certification exam. The map defines and organizes key competencies in terms of levels of proficiency, knowledge, and integrity, and is organized into two categories: first, qualities with skills that are expected to be possessed by all accountants, and second, special competences in accordance with domain skills (Palmer et al., 2004). However, published articles only suggest using one indicator to assess auditor competency. Meanwhile, the research results emphasize two main indicators referred to by many writers (Table 3), which are indicators developed by Palmer et al. (2004).

Palmer et al. (2004) also adopted from previous models that focused on the identification and ranking of knowledge, skills, and attitude (KSA) of individuals (Siegel and Sorensen, 1994). Apart from that, the Competency Framework for Internal Auditing (CFIA) discusses competency criteria, which are a combination of the role of performance attributes, a combination of knowledge and understanding, and a combination of cognitive and behavioral skills. The Institute of Internal Auditors Research Foundation (1999), and the AICPA Core Competency Framework for Entry into the Accounting Profession (1999) share competency frameworks in three parts: competence functional, competence personal, and competence perspective. However, only the research by Supriadi et al. (2019) and Palmer et al. (2004), which utilized the entire Suite indicator, is accurate. In contrast, other articles only use a limited number of auditor competency indicators to address research questions.

Indicator. Often, auditors rely on technological skills and information as their primary competencies. Auditors require skills and technology information, and many companies are increasingly automating their accounting information systems to gain a competitive advantage (Tarek et al., 2017; Thottoli & Thomas,

2022). Information technology skills are essential when auditing computers, particularly in the form of problem-solving skills (Tarek et al., 2017). Integrated auditor competency can improve the quality of audit results; however, diversity in competency assessments will affect the audit process. This condition is a challenge for academics to develop curriculum for the learning process (Dzuranin et al., 2018).

Competence is an important component for creating success not only for individuals but also for organizations (Dzuranin et al., 2018). Individual auditors' competencies can help teams (or organizations) plan audit activities using audit tools (for example, CAATT). Audit activities use tools to collect and analyze data so that they can automatically or continuously improve performance (Wu et al., 2017). Siew et al. (2020) explain that employee information technology (IT) competence has a significant influence on the adoption of CAATT. CAATT requires auditors to have their own skills and sufficient IT to operate the tool and, more importantly, interpret the results (Siew et al., 2020).

To operate CAATT, auditors need special data analysis competencies, and for integrated testing and parallel simulation, they need general computer skills competencies. Auditors must understand computer programming languages to carry out verification (Siew et al., 2020). Auditors often use data analysis as a special skill. Data analysis skills are important for external auditors, both Muslims and non-Muslims, in accommodating the needs of the digital economy (Jaffar et al., 2022). Companies need to invest in auditor competency in data analytics skills to handle big data (Han et al., 2016; Jaffar et al., 2022).

Professional bodies play a crucial role in providing the guidance and training that external auditors require (Jaffar et al., 2022). Problem-solving ability has a significant impact on internal audit performance. The results show that if you have the competence to carry out computer-assisted audits, you need to integrate personal knowledge and experience to

develop problem-solving abilities (Thottoli & Thomas, 2022). Technical auditors emphasize the importance of enhancing IT knowledge and skills (Stoel & Havelka, 2021). Technical auditors prioritize the allocation of learning activities and technological information. The work environment provides an excellent opportunity for external auditors to enhance their skills and competence. Characteristic work: By exchanging information with colleagues (Alsabahi et al., 2021), the auditor fosters collaboration and study. However, due to potential differences in social interactions, measuring auditor competency and generalizing results can be challenging (Wu et al., 2017). Besides that, skills, technology, and analytic data can change over time based on the need for a profession (Dzuranin et al., 2018).

Appelbaum (2021) explains that auditors have a moment. To evaluate risk and conduct substantive testing, one must have the ability, literacy, deep data processing, and auditing skills. To meet the demands of technological advancements, the audit process necessitates a collaborative effort between technology and data analytics. Therefore, Byrnes et al. (2018) expect auditors to possess data literacy skills to enhance the efficiency and effectiveness of the audit process. However, it is necessary to carry out further research to determine data literacy skills in the audit process in government and government organizations, so that it can provide a new perspective on the development of literature related to the development of auditor competence in the era of digitalization.

The Objective Use Competence Auditors Indicator

The objectives of auditors specializing in indicator competence fall into eight primary categories (Table 3). A portion of the extensive literature includes indicators that assess the preparedness to utilize information technology or embrace innovative technology, accounting for 55%. Table 3.) Auditors use tools to automate various tasks that require information

technology compatibility and skill in running the tools (Ahmi & Kent, 2012). Auditors' level of technology skills and information depends on room-scope auditing. If room-scope auditing is limited, traditional auditing becomes an alternative choice, preventing the use of auditing software (Ahmi & Kent, 2012). Therefore, a series of advantages, including competence auditing, skill auditing technology, technological knowledge, auditor team characteristics, and environmental learning, comprise the adoption strategy of technology auditing. These advantages must be prepared for objective audit success while improving auditor performance (Al-Htaybat & Alberti-alhtaybat, 2017; Alsabahi et al., 2021; Dzurani et al., 2018; Jaffar et al., 2022; Rahma, Yuhertiana & Sundari, 2016; Supriadi et al., 2019; Tarek et al., 2017; Vasarhelyi & Romero, 2014). Blockchain is the next step in the era of digitalization, so it is a consideration to measure the level of readiness (Bonson & Bednárová, 2019; Christea, 2020).

The second objective pertains to the need for competent auditors in organizational government during the digitalization era, with the aim of preparing future generations of quality accountancy and auditing professionals (Al-Tamimi, 2021; Cooper et al., 2009; Coyne et al., 2016; Hey & Corderly, 2021; Palmer et al., 2004). Auditor competency in the digital age can improve the audit process's

effectiveness. Government organizations can enhance the effectiveness of their audit process by utilizing analytical tools such as big data. However, this approach necessitates auditors with data literacy skills to analyze digital-based data and proficient computer usage. Implementation auditing, which typically takes longer than average, indicates a lack of competence among auditors and suboptimal effectiveness (Onumah & Krah, 2012). Adoption of computer-assisted audit techniques aims to improve effectiveness (Siew et al., 2020). Competence-based information technology auditors can increase effectiveness in reporting findings and recommendations impacting the organization (Nazri et al., 2019). Besides that, technology information lowers risk auditing by increasing effectiveness (Han et al., 2016; Mosweu & Hangout, 2019).

Meanwhile, the third objective of auditor competency aims to increase transparency in auditing results through competence auditing (Kabuye, Nkundabanyanga, Opiso & Nakabuye, 2017; Mosweu & Ngoepe, 2019; Schmitz & Leoni, 2019; Torres & Pina, 1999). An appropriate methodology best supports an audit competency that meets the criteria. No accepted methodology can lead to audit failure (Torres & Pina, 1999). Goals for competence auditors The fourth goal is to improve auditing quality. Mock et al. (2018) and Stoel & Havelka (2021) emphasize the importance of technology information (IT)

Table 4.
The theory Used

Topic	Theory	Article
Information Technology	Behavioral Audit Theory; Signaling Theory	1
	Belief function theory,	1
	Innovation Diffusion Theory	1
	Expectancy Theory	1
	Competency Theory	1
	Human Capital Theory (HCT)	1
	Attribution Theory	1
Audit Procedures	Information Theory	1
Auditing System Information	Theory Explained	1
Auditing Tools	Solving Problems-Theory of Behavior	1
	Self-efficacy theory	1
	Body of Theory	1
	Acceptance Theory and Use of Technology (UTAUT)	1
	Diffusion Theory of innovation	1

and its role in enhancing quality auditing. Objective The fifth auditor competency is to assess audit performance by measuring the problem-solving ability of the team and activity auditing computer, as well as the competence of internal auditors (Wu et al., 2017).

The sixth auditor competency objective is timeliness. When reporting is timely and relevant, financial reporting assists in decision-making. Financial reporting accuracy aids the professional audit process by automating procedures and conducting audits with competent auditors (Lombardi et al., 2015; Alsabahi et al., 2021; Stoel & Havelka, 2021). Objective Which final with level government only One article is about opinion formation. This article focuses specifically on 42 government agencies. This quote talks about an objective use indicator that says the "level of readiness to use technology/adoption of technology" more often uses general competency indicators for auditors, like IT skills, with a 55% success rate compared to other auditor competency indicators. Therefore, most of the selected literature emphasizes the need for auditor competency in the current digital era, particularly in the areas of skills and technology information.

Study period front in indicator competence auditors in government organization in the era of digitalization

In the digital age, the study of competent

auditors in organizational governance has grown rapidly. Researchers have examined the significance of auditor competency indicators in anticipating information technology advancements. The results of this review become the basis for opinions regarding the direction of further research, viewed from various perspectives. The recommendations for future research encompass research trends and identify specific questions for further study.

The research question underscores the importance of auditor competency in elucidating the auditor's proficiency in information technology, problem-solving, and data analysis. Future research could explore levels of technological understanding and skill that required auditors to provide service auditing to clients who use technology. It is possible to conduct an extensive analysis of how technology changes, which is a characteristic task for auditors. As a result, we identified six areas that relate to the main themes identified for future research:

Firstly, it is crucial for auditors to possess the competence to navigate the rapid advancements in technology and the accessibility of information while searching for evidence. Ahmi & Kent (2012) explain that auditors use tools to automate various tasks, which require skills in technology information to operate devices (Ahmi & Kent, 2012). The level of information technology expertise an auditor possesses varies depending on the scope of the audit.

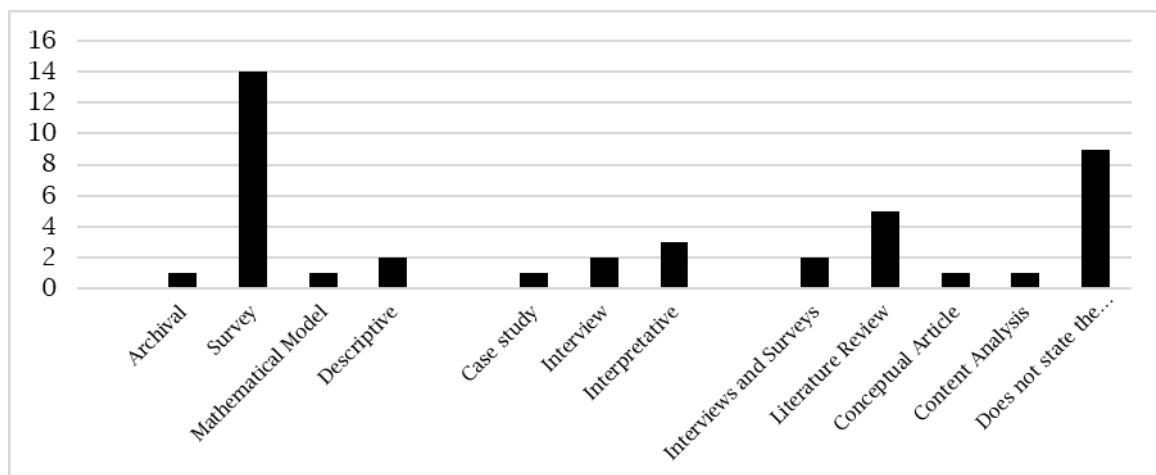


Figure 4.
Purpose Use Competency Indicators Auditors

If the audit's scope is limited, performing traditional auditing without software auditing is the alternative (Ahmi & Kent, 2012). The researcher must be able to respond to the questions that follow: What factors influence the competence of auditors to use technology? What is the motivating factor that encourages auditors to fully participate in the new technology audit? What knowledge does an auditor need to be able to provide technology-based services like big data, blockchain? What information which needed during process auditing in era digitalization?

Secondly, we need to collect literacy data for process auditing, which is based on development technology. This topic is intriguing for research due to its unique methodology, which aims to categorize the literacy level of auditors, particularly those recently recruited (Appelbaum, 2021). The question posed in his research is as follows: When faced with technological advancements, how much literacy do data auditors possess during process auditing?

Third, continuous auditing is a future research topic, so it is necessary to prepare a generation of accountants and auditors who have high professional quality (Al-Tamimi, 2021; Cooper et al., 2009; Coyne et al., 2016; Hay & Cordery, 2021; Palmer et al., 2004). Auditor competency in the context of digitalization can increase the efficiency of the audit process. Involvement in an audit that takes a relatively long time compared to the expected productive time span indicates that the auditor's competence is lacking and efficiency is less than optimal (Onumah & Krah, 2012). The application of computer-assisted audit techniques aims to increase efficiency (Siew et al., 2020). In addition, information technology can reduce audit risk by increasing operational efficiency (Han et al., 2016; Mosweu & Hang out, 2019). As a result, auditors can determine the level of competence required for the continuous auditing process in the digital era by focusing on the following questions: How auditors will Work The same with technology in period front? How harmony method auditing with technology supporter? How change methodology

auditing in enhancement technology based Risk Based Audit (RBA)?

Fourth, study the topic of fraud. Auditors, through their ability to audit, are able to improve the quality of auditing so that results become transparent (Kabuye et al., 2017; Mosweu & Ngoepe, 2019; Schmitz & Leoni, 2019; Torres & Pina, 1999). An appropriate methodological approach ideally supports an audit competency that meets standards. Failure to carry out an audit may occur due to a lack of acceptable methodology (Torres & Pina, 1999). Auditors need expertise to detect and prevent fraud with digital-based processes. The goal is to achieve this through transparency and accountability in management finance during the digitalization era. To objectively address the topic, we need to ask the following essential questions: How competent are auditors to detect fraud in the digital era?

Fifth, information technology (IT) underscores the importance of comprehending how auditors can reduce risk through their knowledge and skills, thereby enhancing audit quality (Mock et al., 2018; Stoel & Havelka, 2021). Therefore, studies focus on the influence of bias in audit decision-making; digital utilization auditing presents a promising avenue for future research, posing the following questions: How can the digitalization of audits help to reduce bias in decision-making?

The sixth study focuses on resilience auditing in the digital age, aiming to equip auditors with the ability to adapt and endure. Generation Accountancy needs to prepare competent auditors who are qualified in a professional way (Al-Tamimi, 2021; Cooper et al., 2009; Coyne et al., 2016; Hay & Cordery, 2021; Palmer et al., 2004). Therefore, the auditor is able to carry out a series of audit activities. We need to identify individuals who can provide assistance in this situation: How do auditors prepare for technological advances? How do auditors evaluate development technologies? What are the tasks that auditors need to complete ahead of time, and which tasks are missing?

CONCLUSION

Many researchers and practitioners are interested in auditor competency because it serves as the foundation for the knowledge and skills required to carry out procedures and audits, ensuring the provision of appropriate, relevant, and transparent information. The previous study highlighted the need for further research, which has contributed to the development of knowledge and strategies related to the identified group topics. Previous research primarily focused on (i) enhancing auditors' technology skills, (ii) mitigating the negative effects of auditors' technology use, and (iii) updating auditing methodology to align with technological advancements.

In the meantime, this article focuses on auditor competency, encompassing (i) the methods for researching auditor competency in organizations and government during the digitalization era and (ii) the focus and criticism of the literature concerning the competence of auditors in organizations and government during the same period. (iii) In this era of digitalization, what does the future hold for auditor competency in government organizations? The results show a significant increase in government regulations related to auditor competency in digital-based government organizations over the past ten years. However, organizational culture (Alsabahi et al., 2021) and organizational and environmental factors (Siew et al., 2020) can influence the assessment of auditor competency indicators, implying that an automatic evaluation of the auditor's competency indicators does not encompass all the factors that impact an auditor's competence. (2020). As accounting information changes in tandem with technological developments, competency guidance becomes dynamic. Therefore, assessing auditor competency is an important component of helping improve audit quality. Researchers often study competencies, problem-solving skills, analysis, and data literacy, but they cannot definitively determine which state has the most dominant competence.

The systematic review of the literature yielded two significant contributions. The first contribution shows how systematic literature analysis explains the implications of the technology for auditors as it has developed over a number of decades. Instruction: This can help future researchers understand research topics, which include auditor competency in audit hill accessibility, continuous auditing, fraud detection in process auditing based on digital, bias in process auditing, and resilience auditing.

The contribution clarifies that the generated trend period aligns with the flow of research findings in the literature. The findings also propose a series of research questions that stem from current trends and require further development. Study This has limitations; namely, the direction of the study period originates from the most recent resHowever, the description remains incomplete, as there is currently no one who can accurately predict the speed of technological evolution.

References

- Ahmi, A., & Kent, S. (2012). The utilization of generalized auditing software (GAS) by external auditors. *Managerial Auditing Journal*, 28 (2), 88-113.
- Alathur, S., Ilavarasan, P.V., & Gupta, M.P. (2012). Citizen participation and effectiveness of e-petition: Sutharyakeralam-India. *Transforming Government: People, Process and Policy*, 6 (4), 392-403.
- Al-Htaybat, K., & Alberti-alhtaybat, L. Von. (2017). Big data and corporate reporting: Impacts and paradoxes. *Accounting, Auditing & Accountability Journal*, 30(40), 850-873.
- Al-Htaybat, K., von Alberti-Alhtaybat, L., & Alhatabat, Z. (2018). Educating digital natives for the future: Accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4), 333-357.
- Al-Tamimi, J.H (2021). E-learning of auditing under the Corona pandemic and its compatibility with International Education Standard No 8 (IES8) related to Auditor Competency Requirements. *Academy*

- of Strategic Management Journal*, 20 (3), 1-17.
- Alsabahi, M.A, Bahador, K.M.K, & Saat, R.M (2021). Skills development factors of information technology competency among external auditors. *International Journal of Information Systems in the Service Sector*, 13(2), 13-28.
- Alsabahi, M.A., Bahador, K.K.M., & Saat, R.M. (2021). The influence of personal characteristics and workplace learning on information technology competency among external auditors: The role of organizational culture as a moderator. *Cogent Business and Management*, 8(1): 1899625.
- Antonio, G.R. (2014). Continuous auditing: Developing automated audit systems for fraud and error detection. *Journal of Economics, Business, & Accountancy Ventures*, 17(1), 127.
- Benlian, A., Kettinger, W.J., Sunyaev, A., & Winkler, Q.J. (2018). Special sections: The transformative value of cloud computing: A decoupling, platformization, and recombination theoretical framework. *Journal of Management Information Systems*, 35(3), 719-739.
- Bonson, E., & Bednárová, M. (2019). Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, 27(5), 725-740.
- Brown-Liburd, H.L., & Wright, A.M (2011). The effect of past clients relationships and strength of the audit committee on auditor negotiations. *Auditing: A Journal of Practice & Theory*, 30(4), 51-69.
- Carroll, M. (2006). *An information systems auditors' s profile*. University of South Africa, 1-18.
- Charalabidis, Y., & Loukis, E. (2012). Participative government policy making through multiple social media platforms utilization. *International Journal of Electronic Government Research*, 8(3), 78-97.
- Cooper, B. J., Leung, L., Dellaportas, D., Burnaby, P., & Hass, S. (2009). A summary of the global Common Body of Knowledge 2006 (CBOK) study in internal auditing. *Managerial Auditing Journal*, 24(9), 813-834.
- Coyne, J.G., Coyne, E.M., & Walker, K. B. (2016). A model to update accounting curriculum for emerging technologies. *Journal of Emerging Technologies in Accounting*, 13(1), 161-169.
- Christea, L.M. (2020). Emerging IT technologies for accounting and auditing practice. *Financiar Audit*, 18 (160), 731-751.
- Dengler, K., & Matthes, B. (2018). The impacts of digital transformation on the labour market: Substitution potentials of occupations in Germany. *Technological Forecasting and Social Change*, 137, 304-316
- Dumitru, C. (2016). The digital revolution and job polarisation: An institutional, economic, and social issue. *Internal Auditing & Risk Management*, 11(2) 105-115).
- Dzurandin, A.C., Jones, J.R., & Olvera, R.M. (2018). Infusing data analytics into the accounting curriculum: A framework and insights from faculty. *Journal of Accounting Education*, 43, 24-39.
- Enrico, B., Papa, L., Bigoni, M., Gagliardo, E.D., & Bruns, H.-J. (2019). Government value and government accounting sector research. *Journal of Government Budgeting, Accounting & Financial Management*, 31(1), 103-136.
- Flowerday, S., Blundell, A.W., & Von Solms, R. (2006). Continuous auditing technologies and models: A discussion. *Computers and Security*, 25(5), 325-331.
- Han, S., Rezaee, Z., Xue, L., & Zhang, J.H. (2016). The association between information technology investments and audit risk. *Journal of Information Systems*, 30(1), 93-116.
- Hay, D. C., & Cordery, C. J. (2021). The future of auditing research in the government sector. *Journal of Government Budgeting, Accounting and Financial Management*, 33(2), 234 -242.
- Iglesias, E. (2006). Resiliencia: Definición, características y utilidad del concepto. *Revista de Psicopatología y Psicología Clínica*, 11(3), 125-146.
- Jaffar, N., Ahmad, A.A.A, & Sulaiman, N.A. (2022). Technology readiness and data analytics competencies of the Muslim and non-Muslim external auditors: A comparative analysis. *Journal of Islamic Accounting*, 13(6), 920-941
- Kabuye, F., Nkundabanyanga, S.K., Opiso, J., & Nakabuye, Z. (2017). Internal audit organizational status, competencies,

- activities and fraud management in the financial services sector. *Managerial Auditing Journal*, 32(9), 924-944.
- Lacuzzi, S. & Padovani, E (2021). Realtime Crisis Management: Testing The Role Of Accounting In Local Governments. *Journal Of Accounting And Public Policy*, 40 (3), 106854
- Lombardi, D.R., Bloch, R., & Vasarhelyi, M.A. (2015). The current state and future of the audit profession. *Current Issues in Auditing*, 9(1), 10-16.
- Manita, R., Elommal, N., Baudier, P., & Hikkerova, L. (2020). The digital transformation of external audit and its impact on corporate governance. *Technological Forecasting and Social Change*, 150, 119751.
- Massaro, M., Dumay, J., & Guthrie, J. (2016). On the shoulders of giants: Undertaking a structured literature review in accounting. *Accounting, Auditing and Accountability Journal*, 29(5), 767-801.
- Mock, T.J., Ragothaman, S.C, & Srivastava, R.P (2018). Using evidential reasoning technology to enhance the audit quality assurance inspection process. *Journal of Emerging Technologies in Accounting*, 15(1).
- Mosweu, O., & Ngoepe, M. (2019). Skills and competencies for authenticating digital records to support audit processes in Botswana government sector. *African Journal of Library Archives and Information Science*, 29 (1), 17-28.
- Munteanu, I., & Newcomer, K. (2020). Leading and learning through dynamic performance management in government. *Government Administration Review*, 80(2), 316-325.
- Nazri, S.N.F.S.M., Rasib, M.I.A., & Zolkifli, S. (2019). The influence of competency, usage of it and career expectations on internal auditor's effectiveness in Government Linked Companies (GLCs). *International Journal of Financial Research*, 10(3), 337-352.
- Noviari, N. (2007). Pengaruh kemajuan teknologi informasi terhadap perkembangan akuntansi. *Jurnal Ilmiah Akuntansi dan Bisnis*, 2(1), 1-14
- Onumah, J.M., & Krah, R.Y. (2012). Barriers and catalysts to effective internal auditing in the Ghanaian government sector. *Research in Accounting in Emerging Economies*, 12(PARTA).
- Palmer, K.N., Ziegenfuss, D.E., & Pinsker, R.E. (2004). International knowledge, skills, and abilities of auditors/accountants: Evidence from recent competency studies. *Managerial Auditing Journal*, 19(7), 889-896.
- Pollack, J., Helm, J., & Adler, D. (2018). What is the Iron Triangle, and how has it changed? *International Journal of Managing Projects in Business*, 11 (2), 527-547.
- Rahma, R., Yuhertiana, I., & Sundari, S. (2016). The use of e-audit in increasing government. *Journal of Theoretical and Applied Information Technology*, 93(2), 449-460.
- Redden, J. (2018). Democratic governance in an age of datafication: Lessons from mapping government discourses and practices. *Big Data & Society*, 5(2), 2053951718809145.
- Santis, S., Grossi, G., & Bisogno, M. (2018). Government sector consolidated financial statements: A structured literature review. *Journal of Government Budgeting, Accounting and Financial Management*, 30(2), 230-251.
- Schmitz, J., & Leoni, G. (2019). Accounting and auditing at the time of blockchain technology: A research agenda. *Australian Accounting Review*, 29(2), 331-342.
- Siew, E.G., Rosli, K., & Yeow, P.H.P (2020). Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques (CAATTs) by audit firms in Malaysia. *International Journal of Accounting Information Systems*, 36, 100445.
- Stoel, M.D., & Havelka, D. (2021). Information technology audit quality: An investigation of the impact of individual and organizational factors. *Journal of Information Systems*, 35 (1), 135-154.
- Supriadi, T., Mulyani, S., Soepardi, E.M, & Farida, I. (2019). Influence of auditor competency in use information technology on the success of e-audits system implementation. *Eurasia Journal of Mathematics, Science and Technology Education*, 15(10), 1-13.
- Tarek, M., Mohamed, E.K.A, Hussain, M.M, & Basuony, M.A.K (2017). The implications of information technology on the audit profession in developing countries: Extent of use and perception importance. *International Journal of Accounting and Information Management*, 25(2),

- 237-255.
- Thottoli, M.M., & Thomas, K.V. (2022). Characteristics of information communication technology and auditing practices: Evidence from India. *VINE Journal of Information and Knowledge Management Systems*, 52(4), 570-593.
- Torres, L., & Pina, V. (1999). An empirical study on the performance of supreme audit institutions in european union privatizations. *International Journal of Phytoremediation*, 21(1), 777-795.
- Vasarhelyi, m A., & Romero, S. (2014). Technology in auditing engagements: A cases study. *Managerial Auditing Journal*, 29(4), 350-365.
- World Bank. (2017). *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC: The World Bank.
- Wu, T.H., Huang, S.M., Huang, S.Y., & Yen, D.C. (2017). The effect of competencies, team problem- solving ability, and computer audit activity on internal audit performance. *Information Systems Frontiers*, 19(5), 1133-1148.