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The Role of Artificial Intelligence in the Audit Process and How to Fraud Detections: A Literature Outlook

Saifudin SAIFUDIN[1], Indira Januarti[2], Agus Purwanto[3]

Abstract

This study is aimed to test the role of artificial intelligence in the audit process and how artificial intelligence plays a role in detecting fraud using a literature review approach. The method used in this study is a systematic literature review using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) method, with an observation period of 32 years from 1992 to 2024. 101 articles were obtained, but only 15 articles were eligible. Of the fifteen articles, it shows that the article from Omoteso (2012) with the highest number of citations, i.e. 253 citations and the article with the least number of citations is the study of Qatawneh (2024). The domains used range from finance, accounting, auditing and also information systems. The limitations of this study are that it was only able to obtain fifteen articles through the PRISMA diagram process. For future research, it is expected to expand the study with the implications of using ATLAS Auditing for fraud prevention and combined with artificial intelligence.

Keywords: *Artificial Intelligence, Audit Process, Fraud Detections, Literature Outlook.*

Introduction

Rapid advancement in Artificial intelligence (AI) has revolutionized various industries, including auditing (Bradley et al., 2024; Seethamraju & Hecimovic, 2020) . Traditional auditing processes have been relying on manual review and sampling techniques, which can be time-consuming, labor-intensive, and prone to human error (Alles, 2015). However, the integration of AI technologies into audit workflows has the potential to streamline these processes, to increase efficiency, and to improve detection of fraudulent activity (Appelbaum et al., 2017). AI-powered tools can assist auditors in various stages of the audit process, from data collection and analysis to risk assessment and report generation, and also further explore factors that influence audit quality to improve market-relevant efficiency (Fedyk et al., 2022; Saifudin & Januarti, 2023).

The algorithms of machine learning can be trained to automate the extraction and to synthesize relevant financial data from vast databases, as well as to reduce the time and effort required for manual data collection (Kokina & Davenport, 2017). In addition, AI-based anomaly detection algorithms can identify unusual patterns or discrepancies in financial records by flagging potential areas of concern for further investigation (Kogan et al., 2014). Moreover, one of the most promising applications of AI in auditing is improving fraud detection capabilities (Koerniawati, 2021; Saifudin & Alinsari, 2024; Sulistyawati et al., 2024). AI algorithms can be trained with historical data of fraudulent activity which enable them to recognize complex patterns and anomalies that might have been missed by human auditors (Perols, 2011). This system can analyze large amounts of financial data, transaction history, and other relevant information to identify potential danger or red flags, such as unusual spending patterns, suspicious vendor relationships, or unauthorized access to sensitive information (Gullkvist & Jokipii, 2013). Several previous studies with relevant themes have been conducted by Zemankova (2019) who studied the impact of implementing artificial intelligence on auditing and accounting using a SWOT analysis approach. Then, Liaras et al. (2024) who also conducted research with a similar theme, i.e. analyzing the current situation related to machine learning in auditing and accounting, including the latest trends, opportunities, and threats. On the other hand, there is a study by Putri et al., (2024) who used a systematic literature review to reveal factors that influence fraud disclosure, including forensic audits, investigative audits and auditor competence.

[1] PhD Student in Accounting, Diponegoro University, Indonesia & Assistant Professor, Accounting Department, Universitas Semarang (USM), Semarang, Indonesia, Email: saifudin@usm.ac.id, (Corresponding Author)
[2] Professor, Accounting Department, Diponegoro University, Semarang, Indonesia, Email: indirajanuarti@lecturer.undip.ac.id
[3] Associate Professor, Accounting Department, Diponegoro University, Semarang, Indonesia, Email: aguspurwanto@lecturer.undip.ac.id.

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Furthermore, Mohanty et al., (2023) who exposed the role of artificial intelligence in detecting fraud in the financial sector, and Indarto et al., (2023) that also revealed fraud detection using machine learning in auditor professional judgment. Moreover, Weber et al., (2024) also conducted a study using a systematic literature review on the application of explainable artificial intelligence (XAI) in the financial sector, where areas such as risk management, portfolio optimization, and applications around the stock market have been well studied, while anti-money laundering is still lacking. Thus, from several previous studies, this study is aimed to test the role of artificial intelligence in the audit process and how artificial intelligence plays a role in detecting fraud using a literature review approach. This is relevant to the general description as in figure 1 regarding the following subject mapping:

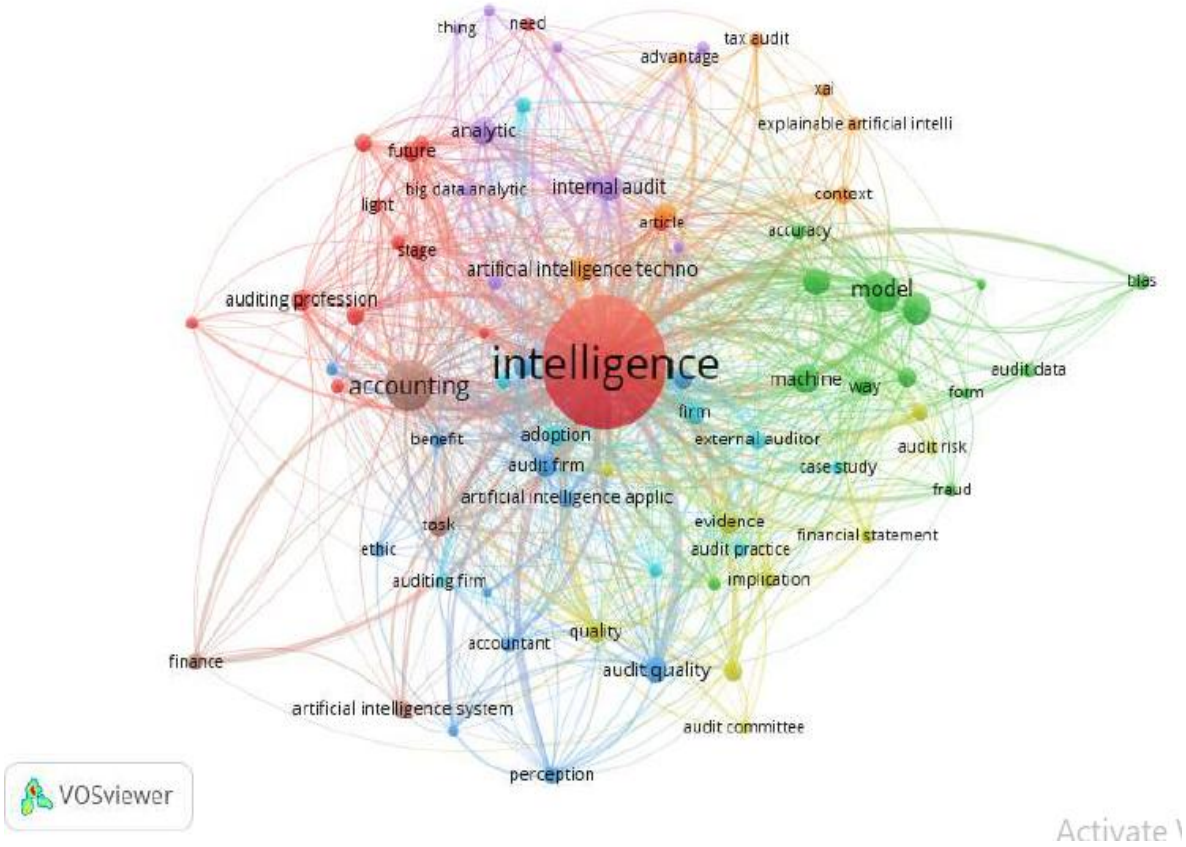

Figure 1. Mapping Subject

Source: Vosviewer, 2024

From figure 1 above, it can be seen that the theme of artificial intelligence is still very relevant to be researched, especially in relation to the theme of accounting, specifically auditing and fraud.

Literature Review

Artificial Intelligence (AI) was first introduced in 1956 by John McCarthy and then widely known as a term since 2006 (Cordeschi, 2007; Manning, 2020). In general, AI is defined as an intelligent system which imitates human intelligence. There are certain elements of autonomous behavior in the system that tend not to require any manual intervention once the system is implemented. AI systems can learn ways to perform certain actions based on historical behavior. Machine learning algorithm engines help AI systems learn from past data which are collected using data acquisition systems or sensors connected to the AI system (Sekar, 2022) . Meanwhile, according to Sheikh et al., (2023), AI is a technology that allows machines

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to imitate various complex human skills. Based on the explanation of the definition, a general description of the classification of AI can be seen in figure 2 below:

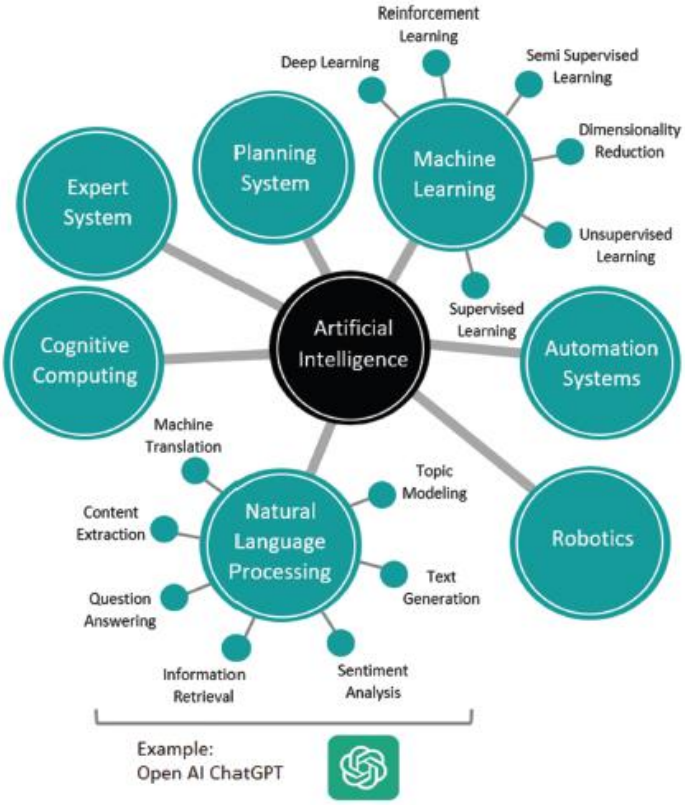

Figure 2. Classification of Artificial Intelligence (AI) Systems.

Source: (Khosravi Et Al., 2023)

The audit process is defined as a clear audit implementation methodology to assist auditors in collecting competent supporting evidence (Messier Jr., 2010; Messier Jr. et al., 2022). This is supported by Boynton & Johnson (2006) stating that the audit process is a method or technique used by auditors to collect and to evaluate sufficient and competent evidence. The stages of the audit process are as follow: 1) preliminary examination stage, 2) detailed examination stage, 3) conformity testing stage, 4) evidence verification stage. In simple terms, the flowchart of an external audit can be seen in the following Figure 3:

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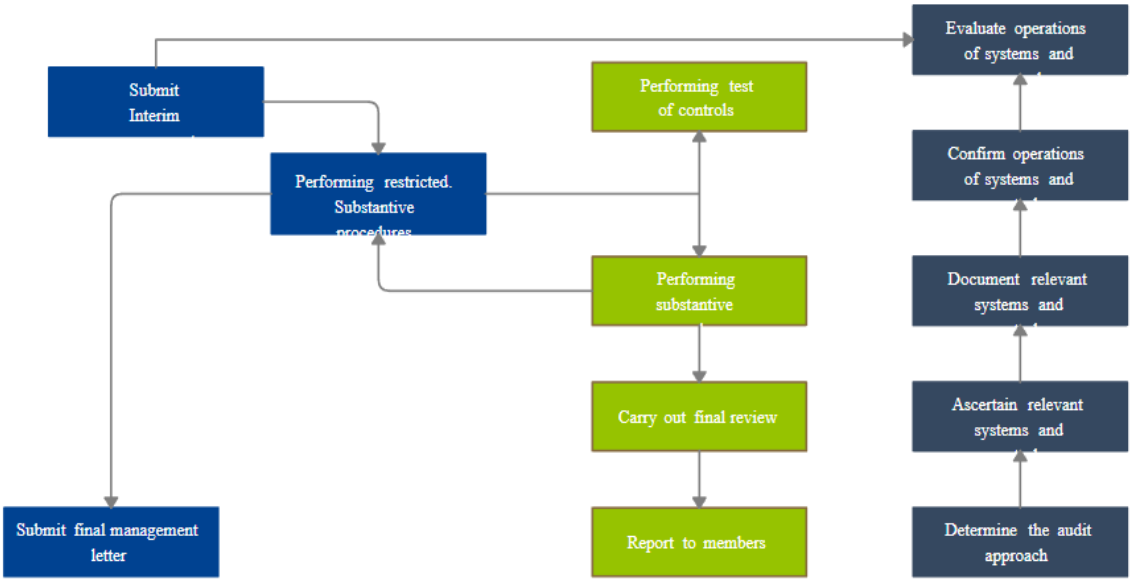

Figure 3. External Audit Process Flowchart

Source: https://creately.com/diagram/example/joe3lg1t2/external-audit-process-flowchart , 2024.

Fraud is defined as the activity of using one's job to enrich oneself through the intentional misuse or using the employing organization's resources or assets for personal benefit (ACFE, 2022; Kou et al., 2004). Meanwhile, according to Saifudin et al., (2023), fraud is any form fraudulent acts intentionally carried out by violating several rules which have been determined by the regulator that are intended to obtain personal gain and harm other parties. The following Figure 4 is an overview of the fraud detection framework:

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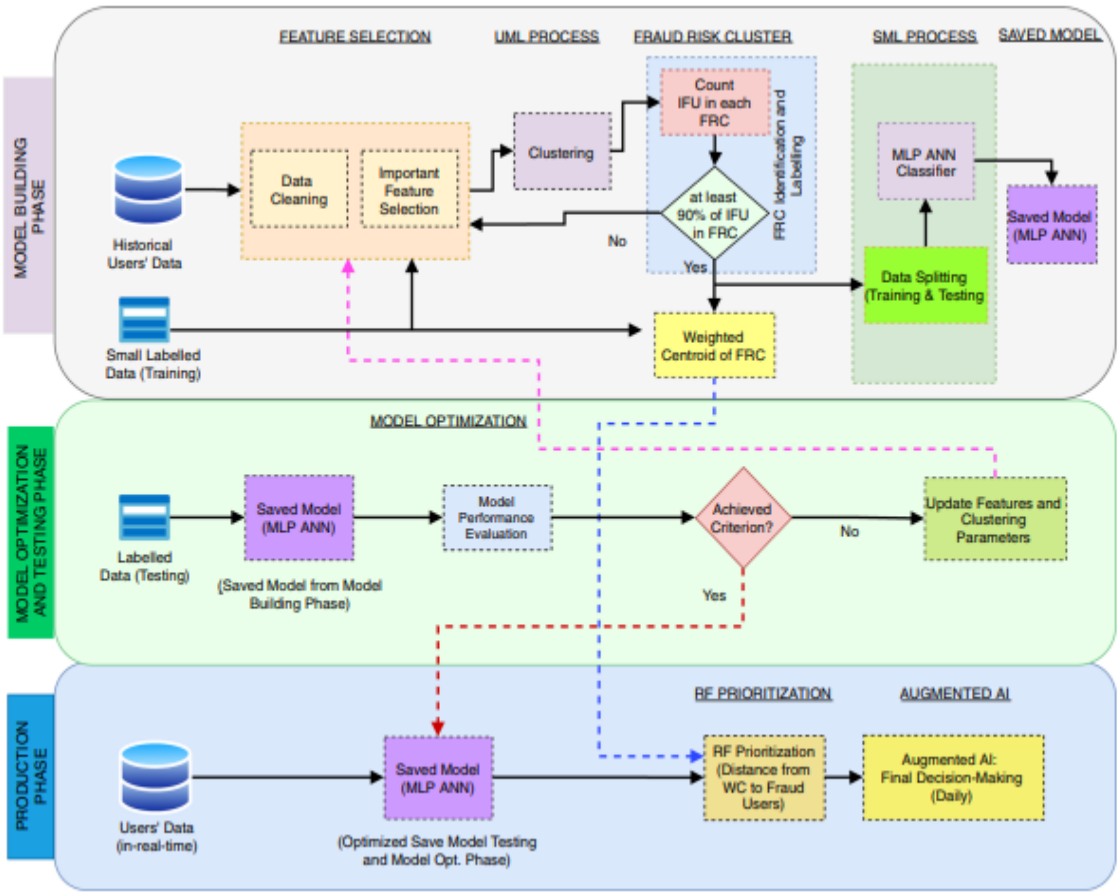

Figure 4. A High Level Architecture of the Proposed Hybrid Fraud Detection Framework for Invoicing Platform

Source: (Wahid & Hassini, 2024)

By integrating AI-powered fraud detection systems into the audit process, organizations can significantly improve their ability to identify and prevent fraudulent activities (Qatawneh, 2024).

Research Methods

The approach used in this study is a systematic literature review (SLR). SLR is a way of synthesizing scientific evidence to answer a particular research question in a transparent and reproducible manner, including all published evidence regarding the topic and assessing the quality of the evidence (Lame, 2019). Furthermore, Lame (2019) also added that SLR has become a primary methodology in various disciplines. The disciplines also include auditing (Handayani et al., 2023). The following are the stages of research using the SLR approach based on guidelines from several references (Page et al., 2021; Simamora, 2024; Trifu et al., 2022). The steps in the search are divided into several processes, i.e. identification, screening, eligibility and included. Such steps are in accordance with the guidelines in PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analysis). PRISMA is a set of evidence-based minimum criteria that aims to help report a variety of systematic reviews and meta-analyses assessing benefits (Liberati et al., 2009; Page et al., 2021).

Search stages used Publish or perish (PoP) tools. PoP is a phrase which describes the pressure placed on academics to publish in scientific journals quickly and continuously as a condition for getting a job (looking for a job), promotion, and even maintaining one's job (Moosa, 2018).

The steps in SLR-based research can be seen in Figure 5 below:

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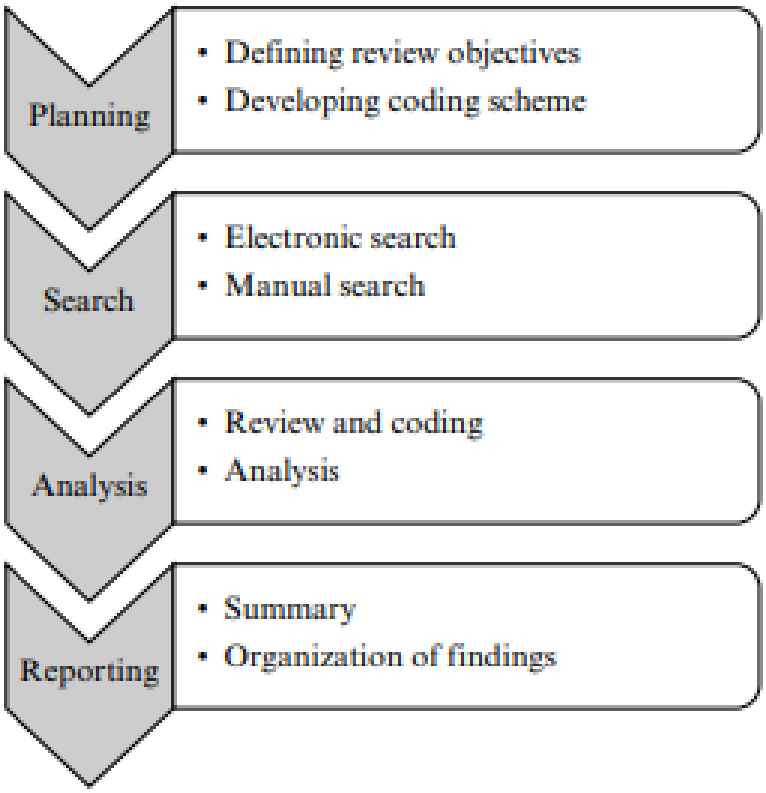

Figure 5. Steps in the Systematic Literature Review

Source: (Gabrielsson, 2017)

From figure 5 above, the first stage is to plan or prepare. In this preparation stage, it is done by preparing the supporting tools used to process the articles to be selected. The tools prepared in the search action are PoP and Vosviewer which have been proven to be very relevant to use (Al Husaeni & Nandiyanto, 2022). In this planning stage, research questions (RQ) are written, where RQ1 covers the role of artificial intelligence in the audit process and how fraud is detected; and for RQ2 covers the domains of artificial intelligence and what fraud detection are used in the audit process. The second stage is literature search, i.e. the process of obtaining relevant research articles to obtain the answers to research questions (Handayani et al., 2023). The following databases were selected for the literature search, such as 1) ScienceDirect, 2) Scopus.com, 3) Google Scholar. The selected articles ranged from publications from 1992 to 2024. Moreover, the literature search strategy used the keywords of "ARTIFICIAL INTELLIGENCE"; "AUDIT PROCESS" and "FRAUD". The third stage is to conduct an analysis. In the analysis stage, a selection of the results of the literature that has been traced is carried out with the help of the PoP application. The literature that has been traced is then selected based on inclusion and exclusion criteria according to the needs in this study. The criteria are as follow.

Inclusion criteria:

The language used is English

The articles are published in international journals between 1992 and 2024

The articles explain about artificial intelligence which has a relationship and is related to the audit process and fraud detection.

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The articles are available in full text form

Exclusion criteria:

The article is not available in full text form

The article does not explain about artificial intelligence which has a relationship and is related to the audit process and fraud detection.

The article does not have relevant research methods

The language used is not English

The fourth stage is reporting. In this reporting stage, it provides a quality assessment of the selected scientific articles by setting quality criteria. The Quality Assessment (QA) criteria in this study include:

QA1: Does the article contain the relationship between artificial intelligence that has a relationship and is related to the audit process and fraud detection?

QA2: What are the domains of artificial intelligence and fraud detection used in the audit process?

Results and Discussion

This study uses PoP to find out articles that are relevant to the topic of the role of artificial intelligence and how to detect fraud in the audit process. The search using PoP gets results as shown in Figure 6 below:

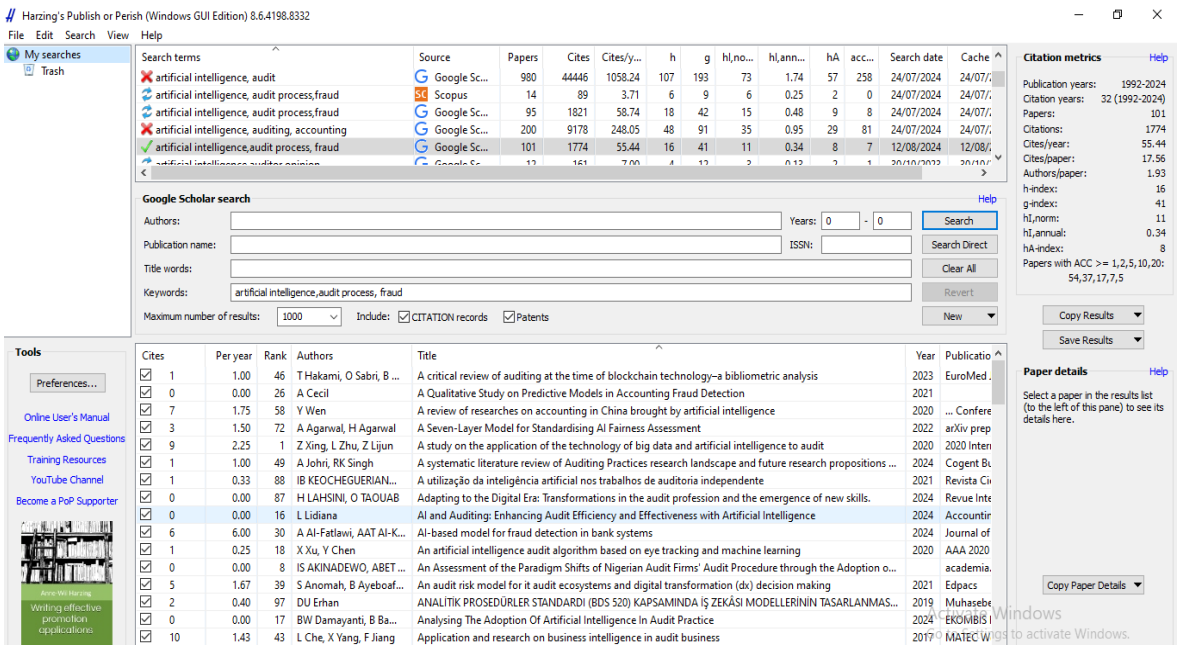

Figure 6. Results of the Search for the Relationship Between Subjects in 1992-2024

Source: Publish or Perish, 2024

Based on Figure 6 above, it is found that the results of the search for relevant articles using publish or perish (PoP) obtained 101 articles from 1992 to 2024 (a time span of 32 years). From the 101 articles obtained, the SLR stage was then continued using the PRISMA method. Furthermore, the description of the result can be seen in the following Figure 7:

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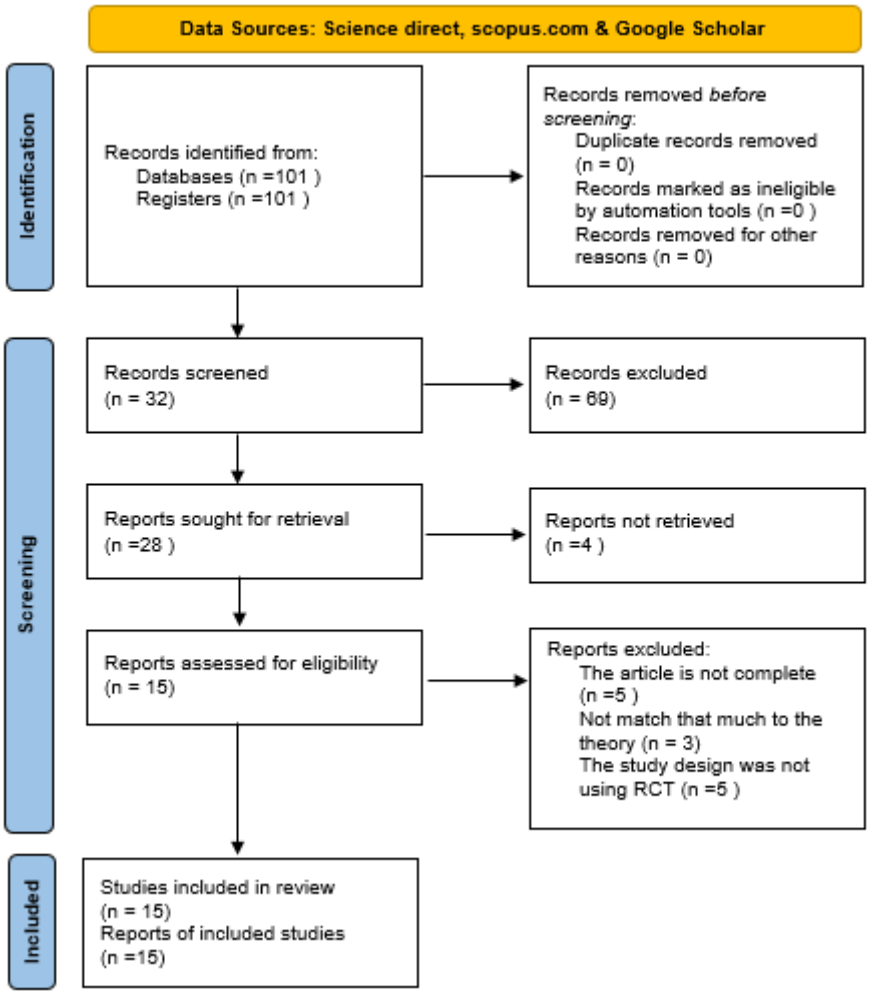

Figure 7. PRISMA Diagram

Source: personalized data processed, 2024 adapted from (Liberati et al., 2009; Moher et al., 2009; Page et al., 2021)

As elaborated in Figure 7 above, it can be explained that the identification process resulted in 101 articles successfully collected. Then, a selection was carried out by sorting the data, i.e. checking the title to avoid duplicate titles, and then after examining the articles whose studies are not relevant, 32 relevant articles were obtained. From the 32 articles, a more in-depth analysis was carried out to obtain relevant data. The expected data criteria include that the article must have a research idea which is relevant to this research topic, i.e. artificial intelligence, audit process and fraud detections, then have a methodology, research and contribute to the theme. From the results of the selection of the remaining titles, 15 relevant articles were obtained. At the eligibility stage, only 15 articles were eligible. It is called eligible when the article has full text after screening, is original, has a good design in its methodology, shows significant research results, and has a proper and appropriate research concept. The 15 articles that were successfully obtained for the theme that matches artificial intelligence, audit process and fraud detections come from journals as seen in the following Table 1.

Table 1. Breakdown of Reviewed Studies

No.	Name of Sources	Total citations
1	Expert Systems with Applications	253
2	Review of Accounting Studies	156

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3	Springer Series in Supply Chain Management vol 11	107
4	Applied Data Science Track Paper	101
5	The essentials of machine learning in finance and accounting	30
6	AI*IA 99:Advances in Artificial Intelligence	25
7	2020 15th Iberian Conference on Information Systems and Technologies (CISTI)-B	17
8	2020 15th Iberian Conference on Information Systems and Technologies (CISTI)-A	13
9	Proceedings of the Twenty-Seventh Conference on Innovative Applications of Artificial Intelligence	12
10	Machine Learning for Auditors	11
11	Accounting Research Journal	5
12	Journal of Information Systems	3
13	IEEE International Conference on Computational Intelligence and Computing Research	1
14	Helion	1
15	International Journal of Organizational Analysis	0

data as of September 17, 2024

From table 1 above, it can be seen that the most cited reference source is expert systems with applications with 253 citations, while the fewest citations are IEEE International Conference on Computational Intelligence and Computing Research and Heliyon, each with 1 citation.

The SLR study successfully obtained 14 selected articles, which are briefly about contributions to the development of the artificial intelligence theme, audit process and fraud detections as elaborated in table 2 below:

Table 2. Literature Review

No.	Authors & years	Title of Paper	Name of journals or books or conference proceedings	Total citations*)	Contribution to subjects
1.	(Omoteso, 2012)	The application of artificial intelligence in auditing: Looking back to the future	Expert Systems with Applications	253	There are 3 broad perspectives; 1) Some of the studies focused on the applicability of some proposed artificial intelligence-based models to specific types of audit assignments, 2) some concentrated on examining theoretical

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No.	Authors & years	Title of Paper	Name of journals or books or conference proceedings	Total citations*)	Contribution to subjects
					frameworks that could be adopted for understanding the impact of artificial intelligence on auditing, 3) while others are being investigated the relative benefits and drawbacks of using these systems in audits.
2.	(Fedyk et al., 2022)	Is artificial intelligence improving the audit process?	Review of Accounting Studies	156	The results of this research show that investing in AI helps improve audit quality, reduces fees, and ultimately displaces human auditors, although the effect on labor takes several years to materialize. Specifically, a one-standard-deviation change in recent AI investments is associated with a 5.0% reduction in the likelihood of an audit restatement, a 0.9% drop in audit fees, and a reduction in the number of accounting employees that reaches 3.6% after three years and 7.1% after four years. Our empirical analyzes show that (1) AI is developed centrally; (2) AI is widely used in auditing; and (3) the primary goal for using AI in auditing is improved quality, followed by efficiency.
3.	(Bao et al., 2022)	Artificial Intelligence and Fraud Detection	Springer Series in Supply Chain Management vol 11	107	This article discusses the most critical challenges in fraud detection and highlights many important empirical considerations in fraud prediction model building. This article also provides a broad overview of the state-of-the-art approaches to predicting fraud in the extant literature

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No.	Authors & years	Title of Paper	Name of journals or books or conference proceedings	Total citations*)	Contribution to subjects
					and suggest promising future research directions.
4.	(De Roux et al., 2018)	Tax Fraud Detection for Under-Reporting Declarations Using an Unsupervised Machine Learning Approach	Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining	101	This research presents a novel approach for the detection of potential fraud tax payers using only unsupervised learning techniques and allowing the future use of supervised learning techniques. This research demonstrates the ability of our model to identify under-reporting taxpayers on real tax payment declarations, reducing the number of potential fraudulent tax payers to audit.
5.	(Chowdhury, 2021)	Prospects and Challenges of using artificial intelligence in the audit process	The essentials of machine learning in finance and accounting	30	This chapter comprehensively focuses on the technical aspects of AI, benefits and challenges of using AI in the audit process, conversion of manual to AI-based audit process in a few simple steps.
6.	(Giannotti et al., 2000)	Experiences with a Logic-based Knowledge Discovery Support Environment	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	25	This article introduces a Logic-Based Knowledge Discovery Support Environment, capable of integrating knowledge extraction and knowledge manipulation. Its flexibility and expressiveness in supporting the process of knowledge discovery in databases is illustrated by presenting two case studies, market-basket analysis and audit planning strategy in fraud detection. We show that the query language deals effectively and uniformly with data preparation, model extraction and model evaluation and analysis, thus

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					providing a powerful formalism where methodologies for classes of challenging applications can be conveniently designed.
7	(Nunes et al., 2020)	Intelligent process automation : an overview over the future of auditing	2020 15th Iberian Conference on Information Systems and Technologies (CISTI)	17	This article brings together the gaps and shortcomings recently revealed in the thought of the so-called traditional audit, and the challenges it faces today. It presents the new technologies, specifically Robotic Process Automation and Artificial Intelligence, as already having expression in today's audit, and which, in a future vision, are enhanced by their combination in Intelligent Process Automation.
8	(Couceiro et al., 2020)	State of the art of artificial intelligence in internal audit context	2020 15th Iberian Conference on Information Systems and Technologies (CISTI)	13	This article features a set of technologies of AI and the set of benefits it adds to the internal audit. Two models of internal audit applied to artificial intelligence demonstrate how internal audit and internal auditors must adapt to the new reality of AI, by not losing their purpose and by bringing benefits to organizations.
9	(Dhuradar et al., 2015)	Robust system for identifying procurement fraud	Proceedings of the Twenty-Seventh Conference on Innovative Applications of Artificial Intelligence	12	In this paper, the authors describe a robust tool to identify procurement related fraud/risk, although the general design and the analytical components could be adapted to detecting fraud in other domains. Besides analyzing standard transactional data, our solution analyzes multiple public and private data sources leading to

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					wider coverage of fraud types than what generally exists in the marketplace. Moreover, our approach is more principled in the sense that the learning component, which is based on investigation feedback has formal guarantees.
10	(Sekar, 2022)	Machine learning for auditors (automating fraud investigations through artificial intelligence)	Machine learning for auditors (automating fraud investigations through artificial intelligence)	11	The book is structured to introduce the reader to internal auditors' evolved role as trusted advisors. The current challenges and solutions faced by the internal audit team are illustrated. This is followed by a primer to machine learning and data science concepts. Data visualization and storytelling are then covered in a great level of detail to support the sharing of audit results. Finally, practical applications of the artificial intelligence concepts are described and demonstrated in terms of recipes. Each recipe is accompanied by working code examples that can be easily incorporated into audits.
11	(Thottoli, 2024)	Leveraging information communication technology (ICT) and artificial intelligence (AI) to enhance auditing practices	Accounting Research Journal	5	Research in AI and auditing has a broad worldwide scope, involving developed and developing nations. ICT perceived benefits have no direct effect on auditing practices. However, ICT training has a mediating effect on the relationship between ICT perceived benefits and auditing practices. ICT adoption has no moderating effect on the relationship between ICT training and auditing practices. This research

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					makes a significant contribution by offering a thorough framework for improving the knowledge management of practicing auditors regarding ICT adoption, training and perceived benefits, a crucial component of auditing practices in the digital age. In addition, it provides insightful information about how AI affects accounting practices, which may point the way for further study in this area.
12	(Koreff et al., 2023)	Exploring the impact of technology dominance on audit professionalism through data analytic-driven healthcare audits	Journal of Information Systems	3	This research shows how use of paraprofessional auditors guided by AI-enabled tools and analytics reflects a very different audit environment. Specifically, auditees' experiences suggest paraprofessional auditors lack specific expertise and credentials to conduct data-driven audits, apply judgment in preference to technology, and ignore the impact of AI-driven decisions on the public interest. Such experiences raise potential concerns for all audits over unbridled use of AI-enabled tools and analytics by novice-level auditors/paraprofessionals, but even more so for audits conducted in contexts where adherence to professional norms is essential to minimizing public interest consequences.
13	(Bhole & Rajput, 2013)	Ensuring accountability for application	2013 IEEE International Conference on Computational	1	The researchers propose the Push Pull key matching algorithm which performs accountability and also

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		sharing in the cloud	Intelligence and Computing Research/IEEE ICCIC 2013		improves the performance of the system by 56% than the existing system. The cloud accountability framework is designed which consists of registration manager, log manager and actual application. Registration manager performs the service level agreement which is done by cloud service provider. When the cloud service provider registers, then he gets the key of UID and IP address. According to the log manager built a key and Push this key securely by encryption process. In encryption process, temporal attribute base encryption and advanced encryption standard are used for security purposes. The application filter is used to perform access roles of the system. These roles are assigned by cloud service provider after completing service level agreement.
14	(Qader & Cek, 2024)	Influence of blockchain and artificial intelligence on audit quality: Evidence from Turkey	Helion	1	Findings show that blockchain technologies and artificial intelligence (AI) utilization in their financial system positively impacts audit quality by assisting in the audit process and the detection of fraud, which also improves financial reporting. Blockchain and Artificial Intelligence in the financial system create confidence for investors, stakeholders, and legislators. Moreover, this study advocates significant implications for investors, government, firms, and

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No.	Authors & years	Title of Paper	Name of journals or books or conference proceedings	Total citations*)	Contribution to subjects
					policymakers. Investors can make investment decisions based on the accuracy of the financial accounts; the government and policymakers can improve the governance mechanism by using the study's findings.
15	(Qatawneh, 2024)	The role of artificial intelligence in auditing and fraud detection in accounting information systems: moderating the role of natural language processing	International Journal of Organizational Analysis	0	This study aims to investigate the moderating role of natural language processing (NLP) on the relationship between AI-empowered AIS (data gathering, data analysis, risk assessment, detection, prevention and Investigation) and auditing and fraud detection. The study's implications lie in its contribution to the development of theoretical models that explore the complementary attributes of AI and NLP in detecting financial fraud. NLP is a useful tool for developing more efficient methods for detecting fraudulent activities and audit risks.

Sources: books, proceedings, articles processed, 2024

From Table 2 above, it can be explained that the fifteen materials have relevance to the topic of artificial intelligence, audit process and fraud detections. While in general, the domains used in the application of artificial intelligence and fraud prevention are in the domains of finance, accounting, auditing and also information systems. Future predictions according to Weber et al., (2024), the domain in the financial sector will expand further, except in the field of money laundering.

Conclusion

Based on the previous explanation, it can be concluded that there are 101 articles related to the theme of artificial intelligence, audit process and fraud detections, which then after being processed with the PRISMA diagram, only 15 articles meet the requirements. Of the fifteen articles, it shows that the article from Omoteso (2012) with the highest number of citations, i.e. 253 citations and the article with the least number of citations is the study of Qatawneh (2024). The domains used range from finance, accounting, auditing and also information systems.

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The limitations of this study are that it was only able to obtain fifteen articles through the PRISMA diagram process. For future research, it is expected to expand the study with the implications of using ATLAS Auditing for fraud prevention and combined with artificial intelligence.

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