# The Current State of Internal Audit Effectiveness Research: A Bibliometric Analysis

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## ABSTRACT

Research on internal audit effectiveness needs to be revisited to incorporate new changes and norms with the advent of Industrial Revolution 5.0 and the post-COVID-19 pandemic. These changes bring new risks to be managed that may impact the effectiveness of the organisation's corporate governance. As an essential direction in internal audit studies, the research status of internal audit effectiveness urgently needs to be mapped. This paper aims to present the current state and issues of internal audit effectiveness worldwide by using a bibliometric analysis method to statistically analyse publications in the Scopus database. This research's main concern is with the most highly cited publications that can extract the most popular research objectives. This research used the VOSviewer visualisation technique to present correlations with keywords to construct a research network. The findings show that the number of publications on internal audit effectiveness research has grown at a fast pace in the last five years. The research methods utilised are mostly based on structural equation models, followed by multiple regression models, and some new analysis approaches, such as decision tree and random forest models and textual mining, have emerged from information technology to accounting research. A deep review of 20 highly cited articles revealed that most of the empirical studies are based on the stakeholders' perspective. Surprisingly, high productivity largely comes from Malaysia and Indonesia, which are categorised as developing nations, and emerging economies, as opposed to developed nations such as the United States of America and Britain, which normally have high research productivity.

**JEL Classification:** M42, M41

**Keywords:** Bibliometric analysis; Corporate governance; Internal audit effectiveness; Internal audit quality; VOSviewer visualisation

# INTRODUCTION

With the outbreak of the COVID-19 pandemic, internal auditing effectiveness (IAE) has gained momentum in recent years, which has forced organisations to adapt to new business modes as the world has experienced restricted movement order. Moreover, the advent of Industrial Revolution 5.0 has accelerated new technologies such as blockchain, artificial intelligence (AI), deep learning and big data, which has renewed interest in remote auditing. This development of new technologies not only introduces a new normal but also presents new risks (Dyball and Seethamraju, 2021). Therefore, the effect of auditing approaches is challenging, such as with automation techniques-smart contracts based on blockchain technology (Zhang et al., 2024a). Internal audits or internal auditing are used interchangeably, and the most common way to evaluate the performance of internal audit functions is to benchmark performance on the basis of the internal audit charter, which reflects the objective of the internal audit function, by assessing its effectiveness and efficiency (Beckmerhagen et al., 2004; Shu et al., 2010). According to Arena and Azzone (2009), the meaning of the word "effectiveness" may be summed up as "the capacity to obtain results that are consistent with the target objective." The Chartered Institute of Internal Auditors (IIA-UK, 2023) defined IAE such that "to be effective, the internal audit activity must have qualified, skilled and experienced people who can work by the Code of Ethics and the International Standards." Therefore, researchers and practitioners have grown interested in internal audits/auditing (IA) studies, and research on the IAE needs further explanation.

The extant literature within various review studies examines internal audit topics, considering IA as a function in the corporate governance framework or IAE (Gramling et al., 2004; Lenz and Hahn, 2015). IAE is an essential area of research that needs to be given the attention it deserves to the degree to which organisations can capitalise on value-adding and organisational performance-enhancing benefits (Lenz and Hahn, 2015; Dicle and Usluer, 2016; Lenz et al., 2014). Related studies on IA have been conducted via a systematic literature review (SLR) or critical literature review (CLR). In contrast, these literature review papers focused on analysing the factors and measurements to assess IAE and did not present any visualisation of network analysis and mapping IAE research topics. However, this study layouts the current situations of IAE research by using a bibliometric analysis method, which maps networks in keywords to cluster investigate the research area. In particular, this study offers standard bibliometric indicators to overview internal audit effectiveness research by extracting data sets from the Scopus database. Additionally, we reviewed the top 20 most cited articles to identify research gaps. This study used the VOSveiwer technique to provide an intuitive and overall view to understand the development of IAE studies.

The findings of this study provide evidence that publications related to IAE research have grown rapidly over the past five years. We examined 112 publications on IAE extracted from the Scopus database. More than 70% of the journals are empirical studies. Most researchers have favoured the structural equation model over the multiple regression model, and some new analysis approaches, such as decision tree and random forest models, which are the practices of machine learning and textual mining, have emerged from information technology to accounting research. Most publications are from Malaysia, Indonesia, and Bulgaria. The Managerial Auditing Journal of Internal Auditing is the most active and cited journal. With the in-depth review of 20 highly cited articles, most of the empirical studies are based on the stakeholders' perspective. This study also revealed that the greatest productivity of these areas of research was concentrated in developing nations and emerging economies. The corporate governance mechanism in developing and emerging countries may still be in a stage of imperfection. IA plays an essential role in corporate governance, provides assurance and consultancy functions such that its effectiveness enhances corporate governance effectiveness and, in turn, forms corporate governance characteristics. Thus, further studies should investigate why this is the case for corporate governance mechanisms in developing countries and the relationship between IA functions and corporate governance characteristics. This paper is divided into six parts: a literature review, methods, results, discussion, and conclusions. This research aimed to gain a deeper understanding of IAE research and help propose future research.

# REVIEW OF LITERATURE

Bibliometric analysis reviews and analyses previous publications on a topic by using a statistical method to map a research detail and network that can identify specific areas for further research (Ellegaard and Wallin, 2015). As bibliometric research has recently grown in popularity, several studies on IA have been conducted (Alietal., 2018; Behrend and Eulerich, 2019; Öztürk and Yılmaz, 2019; Pizzi et al., 2021). The bibliometric literature review method is a more systematic and network mapping analysis for better understanding the landscape of IAE research; however, in the context of IAE research, only SLR articles (Turetken et al., 2020; Ojra et al., 2020; Abdelrahim and Al-Malkawi, 2022) and CLR articles (Yeboah, 2020; Lenz and Hahn, 2015) are included.

For example, Turetken et al. (2020) conducted an SLR to identify publications and collect and synthesise evidence on the operationalisation and factors of IAE by using the search terms "effectiveness" OR "quality" AND "internal audit" in Scopus, ScienceDirect, ACM Digital Library, Web of Science, IEEE Xplore, SpringerLink, and Emerald Insight. These authors read 31 full-text articles and categorised them into two categories, namely, the supply side and demand side, of which they identified 20 and 11 factors, respectively. Ojra et al. (2020) reviewed the literature on culture-based contingencies and conducted an SLR by using search terms "internal audit" OR "internal practices and features" OR "culture and internal audit" OR "factors influencing internal audit effectiveness", among others and selected key access options such as Science Direct, Emerald, Scopus, Google Scholar, and Research Gate. Building on motivation theory, their study reminds us of the significant role that culture plays in organisational dynamics and that national and organisational culture features influence IAE. Abdelrahim and Al-Malkawi (2022) also conducted an SLR on IAE to identify the influential factors to build a conceptual model, and these factors include internal audit organisational characteristics, internal audit relationships, internal audit processes, internal audit resources, and internal audit coordination with other assurance providers.

However, the CLR on IAE similarly highlights influential factors. For example, Yeboah (2020) attempts to review the literature on IAE critically and finds that IAE research focuses on the public sector. The critical measurement is internal auditors' attributes. The relationships between internal auditors and external auditors, chief audits, and senior management play pivotal roles in IAE. Lenz and Hahn (2015), on the basis of a literature review of empirical studies of IAE, categorise these studies into "supply-side" and "demand-side" studies perspective that synthesises the influential factors into a model with macro- and microlevel factors. The related studies on IAE were summarised via an SLR or CLR. Most papers have analysed factors and measurements to assess internal audit effectiveness. At the same time, they did not show any visualisation of network analysis and did not map IAE research topics. To date, no other research has been conducted that focuses primarily on the term internal audit effectiveness, which presents extensive bibliometric analysis.

# RESEARCH METHODOLOGY

Bibliometric analysis is based on the data set on the research topic, and the origin of the data set must be confirmed. The Scopus database is the largest abstract database and the most extensive searchable citation (Burnham, 2006; Nwagwu, 2007; Falagas et al., 2008; Ahmi et al., 2019), so we focused on the Scopus database to extract our analysis data sets in April 2023. Recent years have seen a surge in interest in bibliometric research, which has led to the conduct of a few studies that are relevant to IA research. Because titles are the first thing that readers notice (Zakaria et al., 2021), we employ a search technique that looks only at titles to ensure that the publications that are identified are pertinent to the primary subject of IAE and to reduce the likelihood that a significant number of publications will be overlooked (Kücher and Feldbauer-Durstmuller, 2019). Hence, our search query is TITLE ("internal audit* quality") OR TITLE ("internal audit* effective*") OR TITLE ("quality of internal audit*") OR TITLE ("effective* of internal audit*"). After screening, no duplicate documents that retrieved an initial sample of 112 data sets to be analysed in comma-separated values (.csv) format were identified. Figure 1 shows the processes of data extraction based on the Zakaria et al. (2020) and Moher et al. (2009) models.
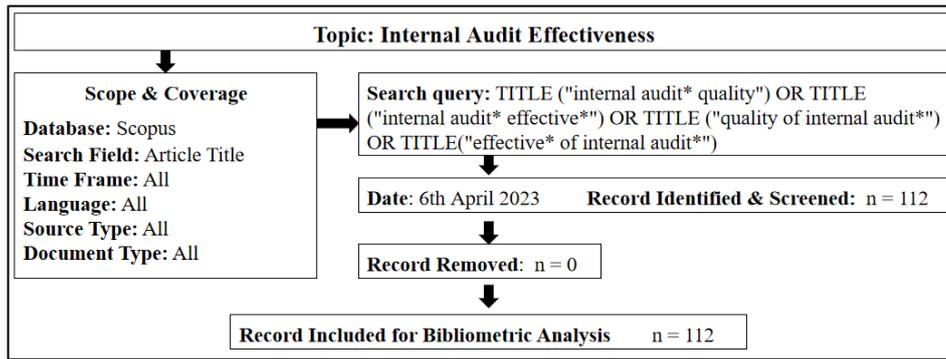
Source: Zakaria et al. (2020) and Moher et al. (2009)

Figure 1 Flow diagram of the search strategy

After the extraction of the data set is completed, the data need to be analysed. We used the following centralised tools for analysis. Microsoft Excel 2016 was used to compute the frequency and percentage of each publication and to create appropriate graphical representations. A pixel map generator was used to create a world map for IAE research. Owing to the issues of one publication with multiple authors from different institutions and countries, we need to clean data to confirm duplicates. Additionally, keywords need to be harmonised when different words have the same meaning. Then, we use Openrefine 3.7.1 to clean and harmonise the data. VOSviewer 1.6.19 creates and visualises bibliometric networks of keywords to show some main trends.

## RESULTS

We extracted information from 112 publications from the Scopus database on the 6th of April 2023. On the basis of this information, we analysed the document and source type; trends of the publications; authors, institutions, and research methods; and countries. In addition to frequency statistics, we also conducted a co-occurrence analysis of keywords and a detailed review of the top 20 highly cited articles.

**Document Profiles**

First, the document type and source type were analysed. This study discovered five types of documents that have been published related to IAE, comprising journals, conference papers, book chapters, reviews, and books. Table 1 shows that more than three-fourths of the total publications are derived from articles representing 92 (82.14%) documents, followed by conference papers 9 (8.04%), book chapters 8 (7.14%), review 2 (1.79%), and book 1 (0.89%). In contrast, under the source type (see Table 1), five types of sources and journals were found to be the highest type of source 93 (83.04%), followed by book series 10 (8.93%) and conference proceedings 7 (6.25%). Book and trade journals represent less than 1% of the total publications on IAE studies.

Table 1 Document Type and Source Type

| Document Type | TNP | Percentage (%) | Source Type | TNP | Percentage (%) |
|---|---|---|---|---|---|
| Article | 92 | 0.82 | Journal | 93 | 83.04% |
| Conference Paper | 9 | 0.08 | Book Series | 10 | 8.93% |
| Book Chapter | 8 | 0.07 | Conference Proceeding | 7 | 6.25% |
| Review | 2 | 0.02 | Book | 1 | 0.89% |
| Book | 1 | 0.01 | Trade Journal | 1 | 0.89% |
| Total | 112 | 100.00% | Total | 112 | 100.00% |

Notes: TP=Total Publications.

Table 2 Languages

| Language | Total Publications (TP) | Percentage (%) |
|---|---|---|
| English | 110 | 98.21% |
| Arabic | 1 | 0.89% |
| Spanish | 1 | 0.89% |
| Total | 112 | 100.00% |

English was the main language used in the publications (110, 98.21%), only one publication used Arabic, and one publication used Spanish (see Table 2).

Concerning the publication subject area, most retrieved documents were published in business, management and accounting, accounting for 76 (67.86%) of the total articles, followed by economics, econometrics and finance, accounting for 59 (52.68%) articles. Table 3 presents details about the subject area of the IAE study.

Table 3  Subject area

| Subject Area | Total Publications (TP) | Percentage (%) |
|---|---|---|
| Business, Management and Accounting | 76 | 67.86% |
| Economics, Econometrics and Finance | 59 | 52.68% |
| Decision Sciences | 15 | 13.39% |
| Social Sciences | 14 | 12.50% |
| Engineering | 11 | 9.82% |
| Arts and Humanities | 8 | 7.14% |
| Computer Science | 8 | 7.14% |
| Multidisciplinary | 5 | 4.46% |
| Biochemistry, Genetics and Molecular Biology | 1 | 0.89% |
| Chemical Engineering | 1 | 0.89% |
| Environmental Science | 1 | 0.89% |
| Materials Science | 1 | 0.89% |
| Medicine | 1 | 0.89% |
| Physics and Astronomy | 1 | 0 89% |

## Publication Trends

It is better to observe the development pattern and popularity of the study subject over time (Ahmi and Mohd Nasir, 2019) when the documents are examined according to the year in which they were published. The growth of IAE-related publications was slow until 2014. Furthermore, since then, the average number of publications per year has been recorded as more than five documents (see Table 4). There were 74 publications from 2018-2023, during these five years, and the number of publications on internal audit effectiveness reached half the total. Among these publications, in addition to the four publications that could not reach the full text and the 8 publications belonging to Nedyalkova's one-book, we reviewed the remaining 62 publications. In 62 publications, there are four conceptual papers, one case study, two literature reviews, three mixed studies, two qualitative studies, and 50 quantitative studies, accounting for more than 80% of the total.

The data analysis was carried out via quantitative methods. In the past five years, most researchers have favoured the structural equation model over the multiple regression model. Moreover, some new analysis approaches, such as decision tree and random forest models, which are the practices of machine learning and textual mining, have emerged from information technology to accounting research.

Table 4 Year of Publication

| Year | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| 1986 | 1 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| 1996 | 1 | 1 | 9 | 9.00 | 9.00 | 1 | 1 |
| 2001 | 1 | 1 | 76 | 76.00 | 76.00 | 1 | 1 |
| 2006 | 1 | 1 | 1 | 1.00 | 1.00 | 1 | 1 |
| 2007 | 2 | 2 | 221 | 110.50 | 110.50 | 2 | 2 |
| 2008 | 1 | 1 | 28 | 28.00 | 28.00 | 1 | 1 |
| 2009 | 2 | 2 | 299 | 149.50 | 149.50 | 2 | 2 |
| 2010 | 2 | 2 | 133 | 66.50 | 66.50 | 2 | 2 |
| 2011 | 2 | 2 | 17 | 8.50 | 8.50 | 1 | 2 |
| 2012 | 1 | 1 | 25 | 25.00 | 25.00 | 1 | 1 |
| 2013 | 1 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| 2014 | 6 | 6 | 148 | 24.67 | 24.67 | 6 | 6 |
| 2015 | 5 | 5 | 142 | 28.40 | 28.40 | 4 | 5 |
| 2016 | 5 | 5 | 167 | 33.40 | 33.40 | 3 | 5 |
| 2017 | 7 | 7 | 48 | 6.86 | 6.86 | 4 | 6 |
| 2018 | 14 | 10 | 114 | 8.14 | 11.40 | 6 | 10 |
| 2019 | 8 | 6 | 55 | 6.88 | 9.17 | 3 | 7 |
| 2020 | 19 | 7 | 29 | 1.53 | 4.14 | 2 | 5 |
| 2021 | 11 | 7 | 29 | 2.64 | 4.14 | 4 | 5 |
| 2022 | 17 | 7 | 28 | 1.65 | 4.00 | 3 | 5 |
| 2023 | 5 | 3 | 3 | 0.60 | 1.00 | 1 | 1 |

Total 112

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Figure 2 presents a direct view of the trend of publication and citation development. In the year 2020, there were 19 publications, which was the year with the highest productivity. The year 2009 has the highest number of citations (149.50 per publication) and a citation total of 299. The detailed statistics about the research published on IAE and its citation matrix per year for retrieved documents.
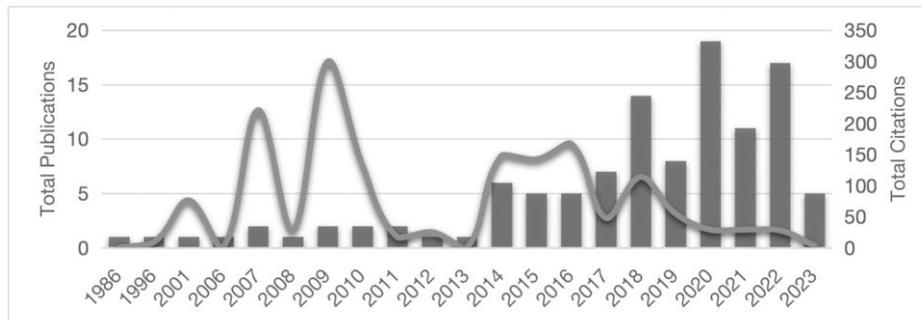


Figure 2 Total Publication and Citations

## Publications by Authors

Authors help shape a study field with their contributions to scientific publications. Table 5 shows the top authors with more than two publications that received at least one citation. Nedyalkova P. is the top author, contributing eight publications to internal audit effectiveness studies. These eight publications come from the book "Quality of internal auditing in the public sector perspectives from Bulgaria and the international context". The most productive authors average two publications in general. This table also shows the impact of the publications based on the total number of citations, h-index, and g-index. Alzeban A. received the highest total number of citations thus far, with 121 citations, followed by Lenz R., who received 109 citations.

Table 5 Most Productive Authors

| Author's Name | Affiliation | Country | TNP | NCP | TNC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|---|---|
| Nedyalkova, Plamena | University of Economics Varna | Bulgaria | 8 | 2 | 2 | 0.25 | 1.00 | 1 | 2 |
| Usang, Obal Usang Edet | Universiti Utara Malaysia | Malaysia | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| Tettevi, Paul Kwaku | Kwame Nkrumah University of Science and Technology | Ghana | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| Salim, Basariah | Universiti Utara Malaysia | Malaysia | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| Saidin, Siti Zabedah | Universiti Utara Malaysia | Malaysia | 2 | 2 | 22 | 11.00 | 11.00 | 2 | 0 |
| Sabbar, Mohammed Hassan | Al-furat al-awsat Technical University | Iraq | 2 | 0 | 0 | 0.00 | 0.00 | 0 | 1 |
| Opoku Ware, Emmanuel | University of Environment and Sustainable Development | Ghana | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| Lenz, Rainer | Global organizations | Belgium | 2 | 2 | 109 | 54.50 | 54.50 | 2 | 0 |
| Karikari Appiah, Michael | University of Environment and Sustainable Development | Ghana | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| James, Kieran | University of Southern Queensland | Australia | 2 | 2 | 84 | 42.00 | 42.00 | 2 | 0 |
| Ghaleb, Ghaleb Saad | Southern Technical University | Iraq | 2 | 0 | 0 | 0.00 | 0.00 | 0 | 1 |
| Coetzee, Philna | University of South Africa | South Africa | 2 | 2 | 40 | 20.00 | 20.00 | 2 | 0 |
| Barac, Karin | University of Pretoria | South Africa | 2 | 1 | 12 | 6.00 | 12.00 | 1 | 1 |
| Baheri, Jusbair | Universitas Brawijaya | Indonesia | 2 | 2 | 3 | 1.50 | 1.50 | 1 | 1 |
| Badara, Mu'azu Saidu | Universiti Utara Malaysia | Malaysia | 2 | 2 | 22 | 11.00 | 11.00 | 2 | 0 |
| Amaning, Newman | Sunyani Technical University | Ghana | 2 | 2 | 4 | 2.00 | 2.00 | 1 | 1 |
| Alzeban, Abdulaziz | King Abdulaziz University | Saudi Arabia | 2 | 2 | 121 | 60.50 | 60.0 | 2 | 0 |
| Abdulahad, Alaa Fareed | Southern Technical University | Iraq | 2 | 0 | 0 | 0.00 | 0.00 | 0 | 1 |
| Abdalamer, Safa Eltyaf | Al-furat al-awsat Technical University | Iraq | 2 | 0 | 0 | 0.00 | 0.00 | 0 | 1 |
| Gamayuni, Rindu Rika | Lampung University | Indonesia | 2 | 2 | 16 | 8.00 | 8.0 | 2 | 0 |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

The number of authors per document is shown in Table 6. A total of 27 (24.11%) documents were published by a single author, while the remaining documents (more than 70% of the total) were coauthored. The article with the greatest number of authors in the IAE study has six (6) authors.

Table 6 Number of Author(s) per document

| Author Count | Total Publications (TP) | Percentage (%) |
|---|---|---|
| 1 | 27 | 24.11% |
| 2 | 42 | 37.50% |
| 3 | 26 | 23.21% |
| 4 | 12 | 10.71% |
| 5 | 4 | 3.57% |
| 6 | 1 | 0.89% |
| Total | 112 | 100.00% |

## Publications by Institutions

Table 7 shows the most productive institutions that published at least two documents related to the IAE study. The top institution is the University of Economics Varna from Bulgaria, with eight documents from a book by Nedyalkova. The second most productive institution is Universiti Utara Malaysia from Malaysia, with five documents. It is followed by Southern Technical University (Iraq) and Universiti Kebangsaan Malaysia (Malaysia), with three documents each.

Table 7 Most productive institutions with a minimum of two publications

| Institution | TNP | TNC | NCP | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| University of Economics Varna | 8 | 2 | 6 | 0.25 | 0.33 | 5 | 5 |
| Universiti Utara Malaysia | 5 | 51 | 2 | 10.20 | 25.50 | 2 | 3 |
| Southern Technical University | 3 | 0 | 2 | 0.00 | 0.00 | 1 | 1 |
| Universiti Kebangsaan Malaysia | 3 | 12 | 3 | 4.00 | 4.00 | 3 | 1 |
| University of Pretoria | 2 | 12 | 0 | 6.00 | / | 0 | 2 |
| University of Environment and Sustainable Development | 2 | 4 | 1 | 2.00 | 4.00 | 1 | 1 |
| Sunyani Technical University | 2 | 4 | 2 | 2.00 | 2.00 | 2 | 0 |
| Makerere University Business School | 2 | 14 | 2 | 7.00 | 7.00 | 2 | 1 |
| Lampung University | 2 | 16 | 1 | 8.00 | 16.00 | 1 | 1 |
| Kwame Nkrumah University of Science and Technology | 2 | 4 | 1 | 2.00 | 4.00 | 1 | 1 |
| Al-furat al-awsat Technical University | 2 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| Al-Balqa Applied University | 2 | 2 | 1 | 1.00 | 2.00 | 1 | 1 |
| Al al-Bayt University | 2 | 17 | 2 | 8.50 | 8.50 | 2 | 0 |
| National Economics University | 2 | 10 | 2 | 5.00 | 5.00 | 2 | 1 |
| Islamic Azad University | 2 | 1 | 2 | 0.50 | 0.50 | 2 | 0 |
| University of South Africa | 2 | 40 | 1 | 20.00 | 40.00 | 1 | 1 |
| King Abdulaziz University | 2 | 121 | 2 | 60.50 | 60.50 | 2 | 0 |
| University of Southern Queensland | 2 | 84 | 2 | 42.00 | 42.00 | 2 | 0 |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

## Publications by Countries

On the basis of the authors' affiliations, the published documents were contributed by authors from 44 countries worldwide. Interestingly, Malaysia is the country with the most scientific papers published on IAE (14 documents), followed by Indonesia (13), Bulgaria (8), Iraq (8), and the United States (8). Table 8 shows the top 20 most productive countries in IAE research.

Table 8 Top 20 Countries contributing to publications

| Country | TP | TC | NCP | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| Malaysia | 14 | 111 | 12 | 7.93 | 9.25 | 6 | 2 |
| Indonesia | 13 | 38 | 7 | 2.92 | 5.43 | 3 | 3 |
| Bulgaria | 8 | 2 | 2 | 0.25 | 1.00 | 1 | 2 |
| Iraq | 8 | 0 | 0 | 0.00 | 0.00 | 0 | 2 |
| United States | 8 | 594 | 7 | 74.25 | 84.86 | 6 | 1 |
| Jordan | 7 | 38 | 6 | 5.43 | 6.33 | 3 | 2 |
| South Africa | 6 | 53 | 4 | 8.83 | 13.25 | 3 | 1 |
| Australia | 5 | 133 | 4 | 26.60 | 33.25 | 4 | 1 |
| Saudi Arabia | 4 | 122 | 3 | 30.50 | 40.67 | 2 | 1 |
| Iran | 4 | 2 | 2 | 0.50 | 1.00 | 1 | 2 |
| India | 3 | 28 | 2 | 9.33 | 14.00 | 2 | 1 |
| Uganda | 2 | 14 | 2 | 7.00 | 7.00 | 2 | 0 |
| Ethiopia | 2 | 132 | 1 | 66.00 | 132.00 | 1 | 1 |
| Viet Nam | 2 | 10 | 2 | 5.00 | 5.00 | 2 | 0 |
| Tunisia | 2 | 4 | 2 | 2.00 | 2.00 | 2 | 0 |
| Netherlands | 2 | 32 | 2 | 16.00 | 16.00 | 2 | 0 |
| Ghana | 2 | 4 | 2 | 2.00 | 2.00 | 1 | 1 |
| Italy | 2 | 30 | 2 | 15.00 | 15.00 | 2 | 0 |
| Bahrain | 2 | 13 | 1 | 6.50 | 13.00 | 1 | 1 |
| Belgium | 2 | 109 | 2 | 54.50 | 54.50 | 2 | 0 |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.
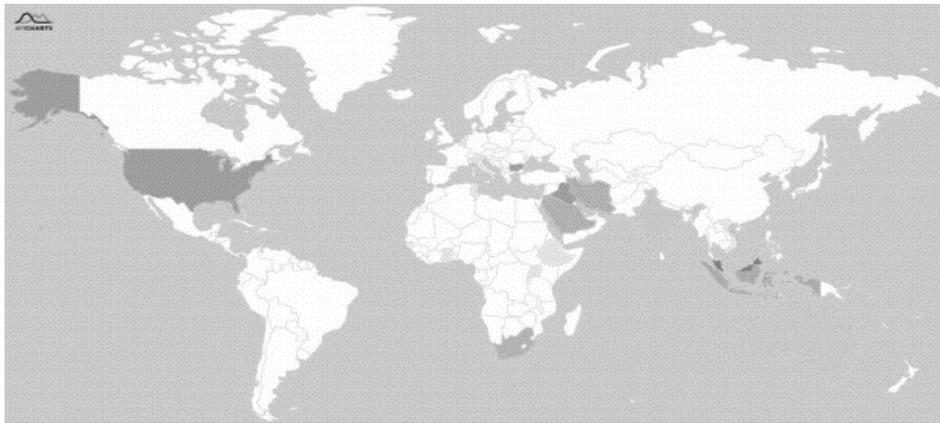


Figure 3 Worldwide scientific production indexed by Scopus on IAE

The global landscape of IAE studies was mapped out, which shows dark to light red, orange, and yellow colours with statistics of productivity (Figure 3). The IAE articles related to production in geography, mainly concentrated in the South Asian region dominated by Malaysia and Indonesia and in the West Asia and Middle East regions dominated by Iraq, Jordan, and Saudi Arabia. In terms of the number of published countries, most are developing or emerging countries. Moreover, there is a possibility that the corporate governance mechanism in developing and emerging countries has yet to reach perfection.

**Publications by Source Title**

Research on the IAE topic has also been published in various journals, proceedings, and books. Table 9 lists journals that published at least two articles on IAE. As shown in the table, the Managerial Auditing Journal ranked first with 13 documents, followed by Contributions to Management Science in second place (8 documents).

Table 9 Most active source titles

| Source Title | TNP | TNC | Publisher | CiteScore 2021 | SJR 2021 | SNIP 2021 |
|---|---|---|---|---|---|---|
| Managerial Auditing Journal | 13 | 397 | Emerald Publishing | 3.5 | 0.449 | 1.052 |
| Contributions to Management Science | 8 | 2 | Springer Nature | 0.7 | 0.130 | 0.000 |
| Academy of Accounting and Financial Studies Journal | 4 | 2 | Allied Business Academies | 1.4 | 0.200 | 0.529 |
| International Journal of Innovation, Creativity and Change | 3 | 0 | Primrose Hall Publishing Group | 0.5 | 0.225 | 0.349 |
| Quality - Access to Success | 3 | 4 | SRAC - Societatea Romana Pentru Asigurarea Calitatii | 1.8 | 0.211 | 0.370 |
| Cogent Business and Management | 3 | 10 | Cogent OA | 2.9 | 0.409 | 0.948 |
| International Journal of Auditing | 2 | 26 | Inderscience Publishers | 0.9 | 0.130 | 0.245 |
| International Journal of Financial Studies | 2 | 3 | Multidisciplinary Digital Publishing Institute (MDPI) | 2.6 | 0.35 | 1.063 |
| Res Militaris | 2 | 0 | Association Res Militaris | 0.7 | 0.112 | 1.051 |
| Asian Social Science | 2 | 7 | Canadian Center of Science and Education | / | 0.124 | 0.341 |
| Journal of Engineering and Applied Sciences | 2 | 3 | Medwell | / | 0.154 | 0.357 |
| Journal of Asian Finance, Economics and Business | 2 | 12 | Korea Distribution Science Association (KODISA) | 2.6 | 0.369 | 1.350 |
| Asian Journal of Business and Accounting | 2 | 28 | Faculty of Business and Economics, University of Malaya | 1.0 | 0.241 | 0.538 |

Notes: TP=total number of publications; TC=total citations; CiteScore = average citations received per document published in the source title; SJR = SCImago Journal Rank measures weighted citations received by the source title; SNIP = source normalised impact per paper measures actual citations received relative to citations expected for the source title's subject field.

The citation metrics for the documents are presented in Table 10. A total of 1,572 citations were recorded, with an average of 42.49 citations each year for the 112 articles that were retrieved.

Table 10 Citation metrics

| Metrics | Data |
|---|---|
| Papers | 112 |
| Number of Citations | 1572 |
| Years | 38 |
| Citations per Year | 42.49 |
| Citations per Paper | 14.04 |
| Citations per Author | 5.98 |
| Papers per Author | 0.43 |
| Authors per Paper | 2.35 |
| h-index | 18 |
| g-index | 38 |

**Highly Cited Documents**

Table 11 lists the 20 most influential documents in IAE studies on the basis of the citations they have received. The most frequently cited document is Prawitt D.F. et al. (2009) study "Internal audit quality and earnings management". Other widely cited documents include studies by Mihret D.G. and Yismaw A.W. (2007), with the title "Internal audit effectiveness: An Ethiopian public sector case study", and Abbott L.J. et al. (2016), with the title "Internal Audit Quality and Financial Reporting Quality: The Joint Importance of Independence and Competence".

Table 11 Top 20 highly cited articles

| No. | Author(s) | Title | Source Title | TNC | C/Y |
|---|---|---|---|---|---|
| 1 | Prawitt et al. (2009) | Internal audit quality and earnings management | Accounting Review | 272 | 18.13 |
| 2 | Mihret and Yismaw (2007) | Internal audit effectiveness: An Ethiopian public sector case study | Managerial Auditing Journal | 132 | 7.76 |
| 3 | Abbott et al. (2016) | Internal Audit Quality and Financial Reporting Quality: The Joint Importance of Independence and Competence | Journal of Accounting Research | 120 | 15.00 |
| 4 | Alzeban and Gwilliam (2014) | Factors affecting the internal audit effectiveness: A survey of the Saudi public sector | Journal of International Accounting, Auditing and Taxation | 97 | 9.70 |
| 5 | Lenz and Hahn (2015) | A synthesis of empirical internal audit effectiveness literature pointing to new research opportunities | Managerial Auditing Journal | 97 | 10.78 |
| 6 | Kaplan and Schultz (2007) | Intentions to report questionable acts: An examination of the influence of anonymous reporting channel, internal audit quality, and setting | Journal of Business Ethics | 89 | 5.24 |
| 7 | Cohen and Sayag (2010) | The effectiveness of internal auditing: An empirical examination of its determinants in Israeli organisations | Australian Accounting Review | 77 | 5.50 |
| 8 | Dittenhofer (2001) | Internal auditing effectiveness: An expansion of present methods | Managerial Auditing Journal | 76 | 3.30 |
| 9 | Mihret et al. (2010) | Antecedents and organizational performance implications of internal audit effectiveness: Some propositions and research agenda | Pacific Accounting Review | 56 | 4.00 |
| 10 | Roussy and Brivot (2016) | Internal audit quality: a polysemous notion? | Accounting, Auditing and Accountability Journal | 37 | 4.63 |
| 11 | Yee et al. (2008) | Perceptions of Singaporean internal audit customers regarding the role and effectiveness of internal audit | Asian Journal of Business and Accounting | 28 | 1.75 |
| 12 | Hutchinson and Zain (2009) | Internal audit quality, audit committee independence, growth opportunities and firm performance | Corporate Ownership and Control | 27 | 1.80 |
| 13 | Erasmus and Coetzee (2018) | Drivers of stakeholders' view of internal audit effectiveness: Management versus audit committee | Managerial Auditing Journal | 27 | 4.50 |
| 14 | Alqudah et al. (2019) | Factors affecting the internal auditors' effectiveness in the Jordanian public sector: The moderating effect of task complexity | EuroMed Journal of Business | 25 | 5.00 |
| 15 | Feizizadeh (2012) | Strengthening internal audit effectiveness | Indian Journal of Science and Technology | 25 | 2.08 |
| 16 | Alzeban (2015) | The Impact of Culture on the Quality of Internal Audit: An Empirical Study | Journal of Accounting, Auditing and Finance | 24 | 2.67 |
| 17 | Trotman and Duncan (2018) | Internal audit quality: Insights from audit committee members, senior management, and internal auditors | Auditing | 22 | 3.67 |
| 18 | Boskou et al. (2019) | Classifying internal audit quality using textual analysis: the case of auditor selection | Managerial Auditing Journal | 19 | 3.80 |
| 19 | Regoliosi and d'Eri (2014) | "Good" corporate governance and the quality of internal auditing departments in Italian listed firms. An exploratory investigation in Italian listed firms | Journal of Management and Governance | 17 | 1.70 |
| 20 | Turetken et al. (2020) | Internal audit effectiveness: operationalization and influencing factors | Managerial Auditing Journal | 17 | 4.25 |

Note: C/Y = Cites per year.

    To further understand the development of IAE research, the top 20 highly cited articles were reviewed. There are three literature review articles, two conceptual articles, one case study article, three qualitative research articles, and 11 quantitative research articles. For example, Getie Mihretetal. (2010) synthesised relevant empirical literature. They employed institutional and Marx's theories to develop a theoretical framework and propositions while suggesting a research plan on IAE and organisational performance. Lenz and Hahn (2015) performed a comprehensive review of IAE research, distinguished this empirical literature into the "supply-side" perspective and "demand-side" perspective, and identified the influential factors as macro and micro. Turetken et al. (2020) conducted a systematic literature review to extract the influencing factors and indicators of IAE, which were synthesised into a framework. Moreover, Dittenhofer (2001) proposed conceptual methods to assess IAE that measure output and outcome aspects. Feizizadeh (2012) conceptually recommended the use of a balanced scorecard to examine internal audit performance with key stakeholders' expectations. Furthermore, Mihret and Yismaw (2007) conducted a case study of a large public sector higher educational institution in Ethiopia to examine internal audit quality, management support, the organisational setting, auditee attributes, and the interplay among these factors that influence IAE, with internal audit quality and management support strongly impacting IAE. Meanwhile, Yee et al. (2008) utilised Marxist economic theory to propose a theoretical framework to perceive IAE by interviewing 83 managers from 25 Singaporean organisations from a stakeholder's perspective, and the results suggested that when internal auditors serve a business partner role, senior and junior managers perceive its value. Roussy and Brivot (2016) interviewed 56 internal auditors and audit committee members of Canadian public or para-

public sector organisations to characterise internal audit quality in four dimensions: input, throughput, output or professional controls. Trotman and Duncan (2018) conducted 36 interviews with audit committee members, senior management, internal audit executives and outsourced providers, and they established a five-dimensional framework with multiple indicators to evaluate internal audit quality.

Among the 11 quantitative research articles, four investigated internal audit quality as an independent variable, three examined internal audit quality as a dependent variable, three investigated the determinants of IAE, and one article examined the factors that affect internal auditors' effectiveness. For example, Kaplan and Schultz (2007) explored the extent to which the quality of internal audit departments and nonanonymous or anonymous audit departments impact anonymous reporting intentions. Hutchinson and Zain (2009) examined the relationship between internal audit quality and firm performance and whether audit committee independence and growth opportunities moderate this relationship. Prawitt et al. (2009) conducted research to evaluate the connection between the quality of the internal audit function and earnings management. Abbott et al. (2016) conducted research to investigate the link between an interaction of competence and the independence of internal audit functions as features of internal audit quality and financial reporting quality and to comprehend the factors that determine the effectiveness of the internal audit function. Meanwhile, Regoliosi and d'Eri (2014) applied a survey of Italian listed companies in the industrial and services sectors to propose the characteristics of internal audit departments as the quality of corporate governance to determine an internal audit quality index. Alzeban (2015) established Hofstede's theoretical framework to examine the effects of different culture dimensions on the quality of internal audits in Saudi Arabia listed companies. The results showed that the greater the power distance and uncertainty avoidance are, the lower the quality of IA, but the greater the individualism is, the greater the quality of IA. Boskou et al. (2019) used seven text-mining techniques to analyse Athens listed companies' annual reports to establish classification models to assess internal audit quality.

Cohen and Sayag (2010) surveyed 180 Israeli organisations to examine the determinants of IAE, regarded the quality of internal audit work as a main factor, and found that management support affects organisational IA independence to determine IAE. Alzaban and Gwilliam (2014) surveyed 79 Saudi Arabian public sector organisations to assess five factors influencing IAE. The results show that a greater perception of IAE is related to better management support for internal auditing. Erasmus and Coetzee (2018) surveyed 117 South African public sector samples to determine the drivers of IAE from the perspectives of key stakeholders, senior management and the audit committee. Furthermore, Alqudah et al. (2019) examined the moderating influence of work complexity on external auditors' collaboration, top management empowerment, and internal auditors' independence, all of which affect internal auditors' effectiveness. According to the findings, external auditors' cooperation, top management empowerment, and internal auditors' independence are the factors that positively and significantly affect internal auditors' effectiveness, as supported by resource-based theory, with only limited support for the role of task complexity as a moderator.

In conclusion, as Lenz and Hahn (2015) classified the available literature on IAE into internal auditors' supply-side perspective and stakeholders' demand-side perspective, we can see that most of the empirical studies of the top 20 IAEs are based on stakeholders' perspective, such as external auditors, audit committees, and senior management (Yee et al., 2008; Trotman and Duncan, 2018; Hutchinson and Zain, 2009; Cohen and Sayag, 2010; Alzaban and Gwilliam, 2014; Erasmus and Coetzee, 2018; Alqudah et al., 2019). Furthermore, several studies in the literature have recognised that internal audit quality is equal to internal audit effectiveness (Trotman and Duncan, 2018; Turetken et al., 2020). However, several studies have explored how internal audit quality influences IAE as a variable (Mihret and Yismaw, 2007; Abbott et al., 2016).

**Research Methods**

Table 12 lists the methods used for IAE research. It analyses the methods of IAE empirical studies, which, in response to practical experience, provide more opportunities for successful works in the future.

Table 12 Research methods

| Research Methods | Total Publications (TP) | Percentage (%) |
|---|---|---|
| Literature review | 4 | 3.57% |
| Case study | 3 | 2.68% |
| Conceptual/Descriptive research method | 11 | 9.82% |
| Qualitative research method | 4 | 3.57% |
| Quantitative research method | 71 | 63.39% |
| Mixed research methods | 5 | 4.46% |
| Others* | 14 | 12.50% |
| Total | 112 | 100.00% |

Note：*Others: including 6 publications whose full texts could not be read and 8 publications from Nedyalkova P., which belong to one book.

According to this table, more than 70% of publications are empirical studies. Four qualitative research papers used an in-depth interview approach, semi structured interviews, and structured interviews (Yee et al., 2008; Roussy and Brivot, 2016; Trotman and Duncan, 2018; Shamsuddin et al., 2018). In five mixed research papers, two studies used a parallel mixed method that both interviewed and surveyed at the same time in no particular order (Van Gelderen et al., 2017; Ta and Doan, 2022); the other three studies first used a qualitative method with an interview, which was based on the interview results, to develop a survey questionnaire, and then, quantitative methods were used (Mazza and Azzali, 2015; Muda, 2018; Shuwaili et al., 2023). Among the 71 quantitative studies, seven used secondary data, 62 used primary data from questionnaire surveys, and the other two did not know their data collection methods.

**Top Keywords**

Table 13 shows the keywords used by the most active authors to search for research trends in the literature. We cleaned the data because the duplicates arose from spelling differences. The top three terms are internal audit, internal audit effectiveness, and internal audit quality, which are related to our search terms, whereas corporate governance, competency, audit committee, and financial reporting quality are the keywords of greatest focus.

Table 13 Top authors' keywords

| Authors' Keywords | Total Publications (TP) | Percentage (%) |
|---|---|---|
| Internal audit* | 43 | 38.39% |
| Internal audit effectiveness* | 26 | 23.21% |
| Internal audit quality* | 17 | 15.18% |
| Effectiveness | 10 | 8.93% |
| Corporate governance | 10 | 8.93% |
| Competency | 7 | 6.25% |
| Audit committee | 7 | 6.25% |
| Financial reporting quality | 7 | 6.25% |
| Public sector | 6 | 5.36% |
| Independence | 4 | 3.57% |
| Internal auditors | 4 | 3.57% |
| Audit quality | 4 | 3.57% |
| Objectivity | 3 | 2.68% |
| Quality | 3 | 2.68% |
| Local government | 3 | 2.68% |
| Iraq | 3 | 2.68% |
| Management support | 3 | 2.68% |
| System literature review | 3 | 2.68% |
| Information technology | 3 | 2.68% |
| Internal Control | 3 | 2.68% |
| Local government performance | 3 | 2.68% |
| Risk management | 3 | 2.68% |

To better understand the relationships among the authors' keywords, the VOSviewer technique was utilised to construct a visualisation chart to directly visualise a network. Since the overall number of keywords is limited, two keywords are considered to draw Figures 4 to 6. Related terms are frequently listed together, as shown using the same colour. Figure 4 shows that three clusters are formed around internal audits, internal audit effectiveness and internal audit quality, with three colours. For example, the diagram suggests that internal audits, corporate governance, information technology, internal control and audit quality, which are in red, are closely related and usually cooccur.
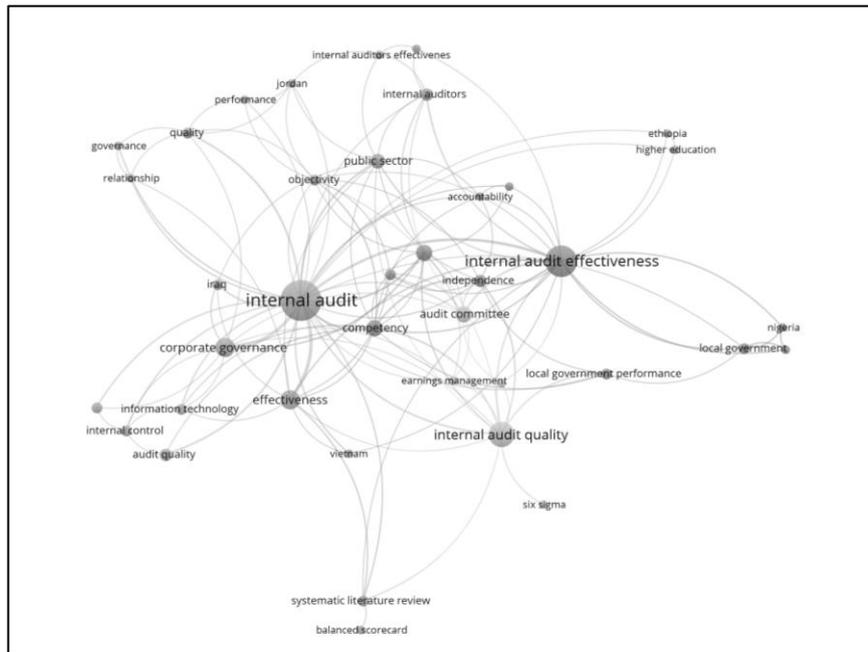
Figure 4 Network visualisation of the authors' keywords

The overlay analysis can reveal a trend of authors' keywords that helps researchers catch the development of IAE dimensions. We mapped eight clusters of visualisation networks from the year 2014. Before 2016, the keywords used were "earnings management, local government, Ethiopia." Between 2016 and 2020, the keywords were "internal audit, quality, effectiveness, corporate governance, public sector, audit committee, internal audit quality." In contrast, from 2020 onwards, the keywords were "internal audit effectiveness, internal auditor effectiveness, internal auditors, six sigma, and balanced scorecard".
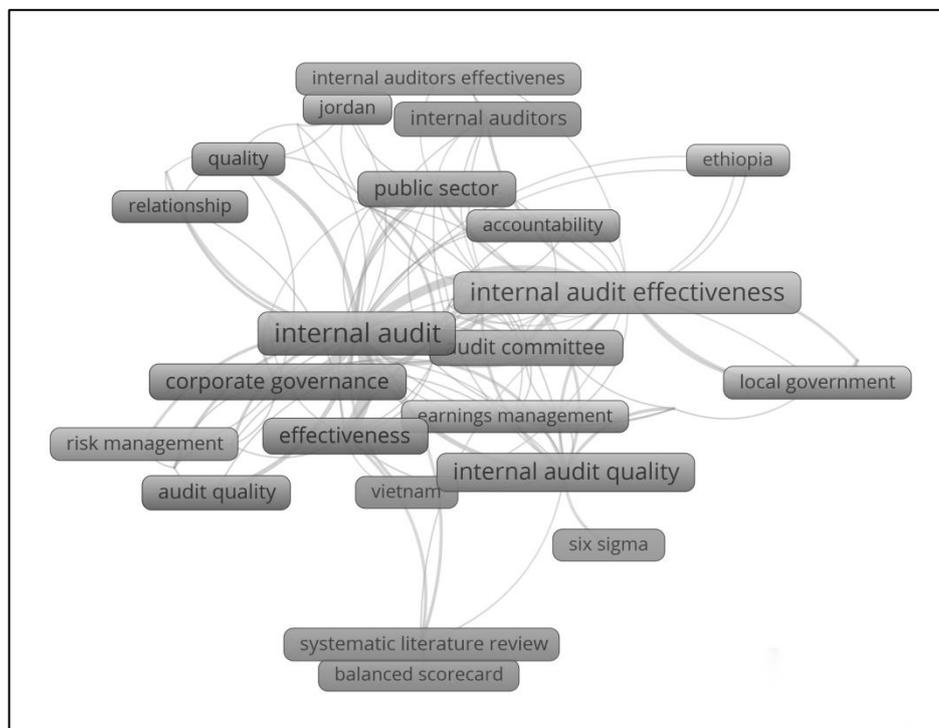


Figure 5 Overlay visualisation of the author keywords
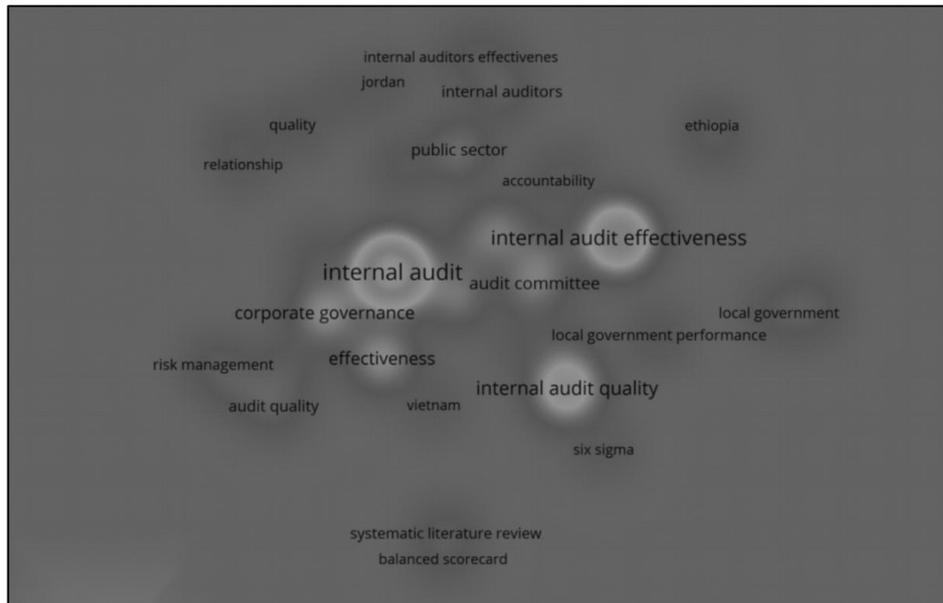
Figure 6 Research themes on the basis of author keywords

Unlike network analysis and overlay analysis, density analysis uses a heatmap to assess the centrality of a topic. Figure 6 shows that the six colours represent the six main research themes. For example, the blue colour shows themes of internal auditors, such as performance, quality, and objective; the purple colour shows themes of internal audit quality, such as the audit committee, earning management, and six sigma, which is an approach to evaluate quality.

# DISCUSSION

Internal audits enhance the efficiency of the operational process and play an important role in corporate governance mechanisms (Shuwaili et al., 2023). In addition, the internal audit function is also a consultant in organisations' risk management and internal control, which improve organisations' performance to achieve their goals (Alzeban and Gwilliam, 2014; Zhang et al., 2024b). The effectiveness of internal audits is determined by their ability to fulfil value-added, assurance and advisory responsibilities, which refers to the degree of quality set to their objectives (IIA, 2020).

This study examined 112 publications on IAE extracted from the Scopus database to provide a systematic and holistic overview. The first Scopus study on IAE was published in 1986, and the growth of IAE-related publications was slow until 2014. Since then, the average number of publications per year has been recorded as more than five documents. From 2018 to 2023, there were 74 publications during these five years, and the number of publications on IAE reached half the total. During this period, most researchers favoured the structural equation model over the multiple regression model. Some new analysis approaches, such as decision tree and random forest models, which are the practices of machine learning and textual mining, have emerged from information technology to accounting research. In addition, it aims to identify the most prolific authors on internal auditing. Nedyalkova P. is the top author contributing eight publications to the IAE; however, his articles are all from the book "Quality of internal auditing in the public sector perspectives from Bulgaria and the international context". The most productive authors average two publications in general. The most productive institution with a minimum of two publications, the top institution, is the University of Economics Varna from Bulgaria, with eight documents, and all these documents are from Nedyalkova P., which belongs to his book.

The most productive institution is Universiti Utara Malaysia from Malaysia, with five documents, followed by Southern Technical University from Iraq and Universiti Kebangsaan Malaysia from Malaysia, with three documents. Malaysia was the country with the most scientific papers published on IAE (14 documents), followed by Indonesia (13), Bulgaria (8), Iraq (8), and the United States (8). We also identify the most abundant sources and the most highly cited documents with the most productive source journals for internal auditing

research, which are the Managerial Auditing Journal, the Contributions to Management Science, the Academy of Accounting and Financial Studies Journal, and the International Journal of Innovation, Creativity and Change. In addition, the most cited article in internal auditing research is a study conducted by Prawitt, Smith, and Wood (2009), "Internal audit quality and earnings management". To further understand the development of internal audit effectiveness research, the top 20 highly cited articles were reviewed.

As Lenz and Hahn (2015) classified the available literature on internal audit effectiveness as internal auditors' supply-side perspective and stakeholders' demand-side perspective, most of the empirical studies of the top 20 internal audit effectiveness studies are based on the stakeholders' perspective, such as external auditors, audit committees, and senior management (Yee et al., 2008; Trotman and Duncan, 2018; Hutchinson and Zain, 2009; Cohen and Sayag, 2010; Alzaban and Gwilliam, 2014; Erasmus and Coetzee, 2018; Alqudah et al., 2019). Furthermore, several studies in the literature have recognised that internal audit quality equals IAE (Trotman and Duncan, 2018; Turetken et al., 2020). However, several studies have explored how internal audit quality influences IAE as a variable (Mihret and Yismaw, 2007; Abbott et al., 2016). With respect to internal audit effectiveness research methods, more than 70% of the publications were empirical studies, and 71 studies used primary data from questionnaire surveyor interviews. Therefore, analysing the approach used for applied empirical studies that respond with practical experience provides more opportunities for successful works in the future.

Finally, the top keywords of internal auditing effectiveness research are "effectiveness", "corporate governance", "competency", "audit committee", "financial reporting quality", "public sector", "independence", "internal auditors", etc. Co-occurrence analysis via overlay visualisation drawn in proportion to years shows that "internal audit", "effectiveness", "earnings management", "objective", and "public sector" were early publication keywords (2014 - 2018). "Internal audit effectiveness", "internal control", "independence", "information technology", and "higher education" were popular in the second phase (2018 - 2020). Terms such as "governance", "six sigma", "balanced scorecard", "internal auditors", and "internal auditors' effectiveness" have become more commonly used in recent years, indicating a shift in research focus on the characteristics and role of the internal audit function from focusing on the methods to evaluate and the internal auditors' role.

The findings of this paper map the trend and contribute to the academic discourse on collective knowledge of internal audit effectiveness by examining the most productive authors, sources, and documents. In addition, the results show how knowledge evolves based on keywords that can serve as a foundation for future research. However, this study has several limitations. The search terms within titles were limited, and the search results focused only on the Scopus database. Furthermore, only the top 20 highly cited articles were reviewed in depth. Therefore, future studies can expand their scope in other databases, review the most relevant articles in empirical studies, and define the differences between internal audit quality and internal audit effectiveness and its indicators.

## CONCLUSION

Internal audits are considered an important part of internal corporate governance mechanisms and are also popularly known as the third line of defence. Thus, internal auditing effectiveness is very important, especially with the advent of the Industrial Revolution 5.0. An increasing number of corporate activities have applied blockchain technology to ensure information security and tamper-proofness and have also used big data analytics and artificial intelligence (AI) to process business data. Remote auditing with new technologies intensifies new challenges and audit risks, as does indivertible changes in internal auditing. Furthermore, the COVID-19 pandemic has changed the future landscape of the business model, in which companies are now accepting the ideas of flexibility working from home. Hence, this new way of change requires new control measures and how this impacts the role of internal auditors and the internal auditing process to ensure the effectiveness of internal auditing.

This paper aims to present the current state and issues of internal audit effectiveness (IAE) worldwide by using a bibliometric analysis method to statistically analyse publications in the Scopus database. This research's main concern is with the most highly cited publications of IAE research that can extract the most popular research objectives. This research used the VOSviewer visualisation technique to present correlations with keywords to construct a research network. The findings of this study show that the number of publications related to IAE research has increased rapidly in the past five years. Most researchers have favoured structural equation

models over multiple regression models, and some new analysis approaches, such as decision tree and random forest models, which involve machine learning and textual mining, have emerged from information technology to accounting research. This provides a new research method for the study of the IAE to fit the development of digitalisation. The bibliometric study provides insights into the productivity of these areas of research, which are largely from Malaysia and Indonesia. There is a possibility that the corporate governance mechanism in developing and emerging countries is still in the perfection stage. IA plays an essential role in corporate governance, provides assurance and consultancy functions in which its effectiveness enhances corporate governance effectiveness and, in turn, is part of corporate governance characteristics. Thus, further studies should investigate why this is the case for corporate governance mechanisms in developing countries and the relationships among IA functions, IA effectiveness, corporate governance characteristics and IA effectiveness.

# ACKNOWLEDGEMENT

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