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RESEARCH ARTICLE

Assessing the impact of intellectual capital on audit quality within the audit market dynamics

Chao Meng[1,2], Dewi Fariha Abdullah[1], Saleh F. A. Khatib[1,*], Norhalimah Idris[1]

[1] *Faculty of Management, Universiti Teknologi Malaysia, Johor Bahru 81310, Malaysia*

[2] *Faculty of Accounting, Hebei Finance University, Baoding 071000, China*

*** Corresponding author:** Saleh F. A. Khatib, saleh.f.info@gmail.com

ABSTRACT

This study aims to analyse the relationship between Intellectual Capital and Audit Quality in the context of the competitive Audit Market. The main goal of the research is to analyse the impact of Intellectual Capital on Audit Quality, specifically focusing on its presence and management. The methodology utilised a systematic literature review approach, which involved creating a detailed protocol to define the research question, guide the synthesis methodology, and establish criteria for inclusion and quality assessment. The Scopus database was used to conduct a search based on predetermined criteria. This search yielded a total of 217 initial results. After a process of refinement and thematic selection, a total of 144 papers and reviews were chosen for analysis. The selection was made in accordance with the PRISMA statement filtration. The study highlights the significant connection between Intellectual Capital and Audit Quality, underscoring the strategic value of intellectual assets in improving the effectiveness and trustworthiness of audit services in competitive auditing firms. The study highlights the importance of consistently investing in knowledge-based skills, advanced technology, and human capital to effectively respond to changing client demands and regulatory obligations. The implications of this extend to various parties such as auditors, policymakers, and stakeholders. It highlights the significance of promoting a culture that encourages knowledge sharing, investing in training and development initiatives, and adopting advanced audit procedures. These measures are crucial for improving overall audit quality and enhancing the credibility of financial reporting in the ever-changing audit market.

Keywords: audit quality; intellectual capital; competitive audit market; financial reporting; knowledge-based assets

1. Introduction

The importance of auditing in assuring the accuracy and integrity of financial reporting is crucial in today's complicated and changing corporate environment[1]. The trust and confidence of investors, stakeholders, and the larger financial market are directly impacted by the calibre of audit services[2]. There is a growing understanding of the significance of intellectual capital as a strategic asset in the audit profession as auditors deal with rising expectations for improved audit quality and accountability[3]. The term "intellectual capital" refers to the intangible knowledge-based assets, such as human, structural, and relational capital, that an organisation uses to gain a competitive advantage and create value[4].

In academic and professional circles, interest in the connection between intellectual capital and audit

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quality has grown[5]. The role of intellectual capital in influencing audit outcomes has been recognised in several research[6]. It is commonly recognised that intellectual capital plays a crucial role in developing auditor competence, streamlining audit processes, and promoting a culture of lifelong learning within auditing companies[7]. Researchers have noted that greater risk assessment, more effective internal control review, and enhanced financial reporting quality are all influenced by the knowledge, abilities, and competence of auditors[8]. Additionally, in the setting of the cutthroat audit market, intellectual capital becomes a crucial factor in determining the success and competitiveness of audit firms[9]. According to Chowdhury et al.[10]; Weqar et al.[11], firms that strategically employ their intellectual capital are better able to win and keep clients, exhibit audit quality, and uphold their reputation[12]. The intellectual capital acquired by auditing professionals is what enables them to adapt to new audit issues, such as the growing complexity of financial instruments and technology improvements[13].

In the context of the cutthroat audit market, the current study investigates the relationship between intellectual capital and audit quality[14]. The audit market presents challenges for auditors to provide high-quality audit services while preserving their competitive advantage due to the abundance of auditing companies fighting for customers[15]. It is crucial for auditors, decision-makers, and other stakeholders in the financial reporting ecosystem to comprehend how intellectual capital affects audit quality results to increase the overall efficacy and legitimacy of auditing practices[16]. In addition, by providing a comprehensive viewpoint on how intellectual capital directly impacts audit quality results in the cutthroat audit market, the research aims to add to the body of academic knowledge. For auditors looking to use their intellectual capital resources to offer high-quality audit services and maintain competitiveness in the changing audit landscape, the findings are anticipated to have practical consequences[1,17]. The research's insights will also be helpful to stakeholders and policymakers, allowing them to make decisions that will develop the auditing profession and promote financial reporting's credibility.

The primary focus of this study is to investigate the impact of intellectual capital on audit quality within the context of a competitive audit market. Intellectual capital encompasses the collective knowledge, expertise, and competencies possessed by auditors and audit firms. Audit quality is determined by how well the audit services align with the expectations and requirements of the users. The study seeks to address the research question: What is the impact of the availability and utilisation of intellectual capital on the quality of audit services in the audit market? The study will analyse the various components and mechanisms of intellectual capital that contribute to the improvement of audit quality. The study will examine the impact of intellectual capital on the competitiveness of audit firms and its implications for trust in the audit market.

2. Materials and methods

The review process was conducted in accordance with the established guidelines for a systematic literature review[18–20], initially, a review protocol was developed to define the study's methodology and objectives. The methodology employed a systematic approach, which involved setting specific inclusion and exclusion criteria based on predetermined standards. The purpose of the criteria-setting phase was to guarantee that the chosen items were appropriate and in line with the research objectives. Following that, a thorough investigation was carried out in order to locate relevant research materials pertaining to the subject matter of interest.

After identifying the publications, a thorough evaluation was conducted to assess their quality and relevance to the research issue. The process required collecting pertinent data from the selected publications and analysing the results to derive significant insights. The review process comprised multiple stages, with each stage playing a role in shaping the overall methodology.

The first step in the process was to create a protocol that clearly stated the main research question, provided guidance on how to conduct the synthesis, outlined the search strategy, and established criteria for including studies and assessing their quality. The research question examines the relationship between Intellectual Capital, Audit Quality, and the Audit Market. It seeks to understand how the presence and management of Intellectual Capital impact Audit Quality.

In the next stage, the Scopus database was used along with predefined criteria to identify items that are relevant to the study issue. The criteria were used to ensure that the materials selected were in line with the research goals, specifically in investigating the connection between Intellectual Capital and Audit Quality within the Audit Market context.

During the third stage, the creation and concatenation of search strings were performed in order to generate keywords that would facilitate an efficient search process. The use of wildcard symbols significantly improved the search process, leading to an initial set of 217 results. The titles, abstracts, and keyword sections of papers were analysed to identify these keywords. The selection of themes from various disciplines was done to improve relevance. After implementing specific criteria, the number of results was narrowed down to 155.

The study deliberately concentrated on articles, book chapters, and review publications, which resulted in a more refined selection. The investigation deliberately focused on published records and English-language papers. The PRISMA statement filtration method was utilised, resulting in the inclusion of 144 papers and reviews. **Figure 1** presents a comprehensive visual representation of the inclusion and exclusion criteria outlined in the PRISMA statement.

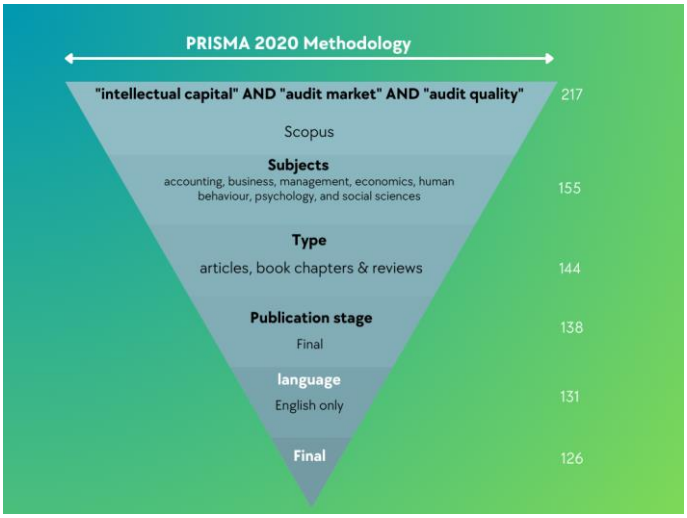

Figure 1. The preferred reporting items for systematic reviews and meta-analyses reporting guideline (PRISMA statement).

3. Results

The Bibliometrix RStudio-4.2.1-win software was used in the descriptive analysis research in this bibliometric investigation. The most widely used R package, Bibliometrics, is being utilised in an increasing number of papers[21,22]. Bibliometrics allows R users to import a Scopus bibliography database. In line with a logical bibliometric approach, a specific tool called Bibliometric was designed utilising statistical computing and the R programming language. System R is widely regarded as the de facto standard platform for developing statistical algorithms, and it is one of the dynamic software tools used for data analysis and visualisation (View of Mapping Research on Using Biblioshiny)[23]. The analysis of the data takes the form of the publishing year, author, publisher, organisation, nation, and keywords utilised in the research paper.

Table 1 contains critical information regarding the data utilised in the research investigation. Data collection will be placed from 2015 to 2023, a period of eight years. The data was gathered from 60 distinct periodicals, books, and other related resources, yielding a total of 126 papers for study. The gathered data has an annual growth rate of −1.08%, showing a minor decrease in the number of documents over time. The average age of the papers included in the analysis is 3.87 years, indicating that the study predominantly focuses on recent publications. Each work has gotten an average of 12.17 citations, showing some level of recognition and importance within the academic world. Concerning the content of the documents, the researchers examined a total of 13 Keywords Plus (ID), which are extra phrases beyond regular keywords intended to improve the discoverability of the text. There are also 346 Author's Keywords (DE), which indicate the key subjects and themes linked with the study publications.

Table 1. Overview of Data Characteristics and Research Collaboration in the Study of Intellectual Capital and Audit Quality Based on the Audit Market (Timespan: 2015–2023).

Description	Results
Timespan	2015:2023
Sources (Journals, Books, etc)	60
Documents	126
Annual Growth Rate %	−1.08
Document Average Age	3.87
Average citations per doc	12.17
References	6510
Keywords Plus (ID)	13
Author's Keywords (DE)	346
Authors	316
Authors of single-authored docs	11
Single-authored docs	11
Co-Authors per Doc	2.83
International co-authorships %	33.33
article	123
review	3

The study included 316 distinct writers' contributions, and 11 of the texts were single-authored, demonstrating the presence of both single-authored and collaborative works. Each paper had an average of 2.83 co-authors, demonstrating a collaborative tendency in the study area. Notably, 33.33% of these co-authors come from overseas affiliations, indicating the collaboration's worldwide scope. Furthermore, in terms of document categories, the majority of the data comprises articles (123) and review publications (3), showing a concentration on original research papers and critical appraisals of existing literature.

In addition, **Table 2** provides a detailed analysis of the citation metrics for research articles published in the study of Intellectual Capital and Audit Quality based on the Audit Market from 2015 to 2023. The table shows the average number of total citations per article (Mean TC per Art), the number of articles (N) published each year, the average number of citations per year (Mean TC per Year), and the number of citable years (Citable Years). With a total of 12 publications published that year, the average number of total citations per article in 2015 was 24.08. The average number of citations per year for these papers was 2.68, with a citation span of 9 years, demonstrating that the publications published in 2015 received citations for a long time. With

13 publications published in 2016, the average number of total citations per article grew to 38.77. These articles received 4.85 citations per year on average, with an average citation duration of 8 years.

Table 2. Citation metrics analysis of intellectual capital and audit quality research in the audit market.

Year	Mean *TC* per art	*N*	Mean *TC* per year	Citable years
2015	24.08	12.00	2.68	9
2016	38.77	13.00	4.85	8
2017	18	9.00	2.57	7
2018	11.61	18.00	1.93	6
2019	9.94	17.00	1.99	5
2020	5.85	13.00	1.46	4
2021	3.94	17.00	1.31	3
2022	1.44	16.00	0.72	2
2023	3.18	11.00	3.18	1

In 2017, the average number of total citations per piece was 18, a decrease from the previous year. There were 9 articles published that year, with an average of 2.57 citations per year and a citation span of 7 years. The average number of total citations per article declined to 11.61 in 2018, with 18 papers published. These articles earned an average of 1.93 citations per year during a 6-year period. In 2019, 17 papers were published, with an average of 9.94 total citations per article. These articles got an average of 1.99 citations each year during a 5-year period. The average number of total citations per publication fell to 5.85 in 2020, with 13 papers published. These articles received 1.46 citations per year on average, with a citation period of 4 years.

With 17 publications published in 2021, the average number of total citations per article fell further to 3.94. These articles received 1.31 citations each year on average, with a three-year citation span. With 16 publications published in 2022, the average number of total citations per article fell dramatically to 1.44. These articles received 0.72 citations each year on average, with a citation period of two years. Finally, with 11 publications published in 2023, the average number of total citations per article grew somewhat to 3.18. Notably, the average number of citations per year equaled the average number of total citations per article this year, showing that these papers were cited within the first year of publication. **Table 2** gives a detailed temporal analysis of the citation metrics, allowing academics to understand the changes in citations over time for works in this field of study. Furthermore, over a nine-year period, from 2015 to 2023, **Figure 2** shows the yearly production of research publications in the academic topic of Intellectual Capital and Audit Quality within the Audit Market. The graph displays the number of papers that were published in each year. The statistics show that there were variations in this study area's publication output throughout time. 12 papers were published in 2015, while 13 were published in 2016, which was a little increase. The output of publications fell to 9 articles in 2017. The yearly productivity increased noticeably starting in 2018 and peaked in 2018 with the publication of 18 publications. Following that, there were 17 papers published in 2019, 13 articles in 2020, and 17 articles in 2021, which is a reasonably consistent amount. With 16 papers published in 2022, there was a slight decrease in the number of publications. The yearly production finally saw a further decline in 2023, dropping to 11 items.

However, the shifting pattern shown in **Figure 2** points to varied degrees of research activity and interest in the audit market's discussion of intellectual capital and audit quality across the chosen period. The increased output between 2018 and 2021 may be explained by new research trends, changes in policy, or other aspects affecting the behaviour of academic publishers. On the other hand, a change in research priorities or a reduction in output throughout 2022 and 2023 may be indicative of a change in research emphasis.

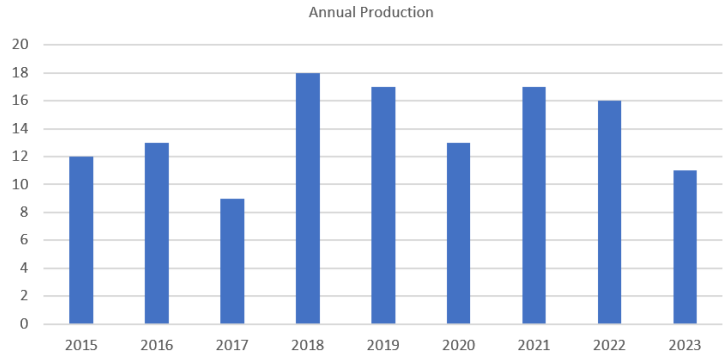

Figure 2. Annual production of research articles.

Moreover, in the academic research publications on Intellectual Capital and Audit Quality in the Audit Market, the sources that have been mentioned the most frequently are listed in detail in **Figure 3**. The source information and the number of articles where each source was mentioned are shown in the figure. In addition, the most often cited source, Auditing is mentioned in 12 different articles. Accounting Review which has been mentioned in 7 articles, is just behind. The third-placed sources, each referenced in six papers, are Managerial Auditing Journal, European Accounting Review and International Journal of Auditing.

The International Journal of Accounting which is referenced in 5 articles, is followed by the "Academy of Accounting and Financial Studies Journal" the "Asian Review of Accounting" and the "Contemporary Accounting Research" which are each referenced in 4 articles. The last item on the list, Accounting and Business Research is cited in three publications. The findings from **Figure 3** illustrate the important and often cited main academic sources that have been used in the investigation of intellectual capital and audit quality in the audit market. These resources act as knowledge pillars, directing researchers' inquiries and influencing the conversation on the subject. In order to facilitate future study and breakthroughs in this particular topic, academics in the field can facilitate further exploration and advancements by discovering the most cited sources and gaining insights into the fundamental works and current research trends.

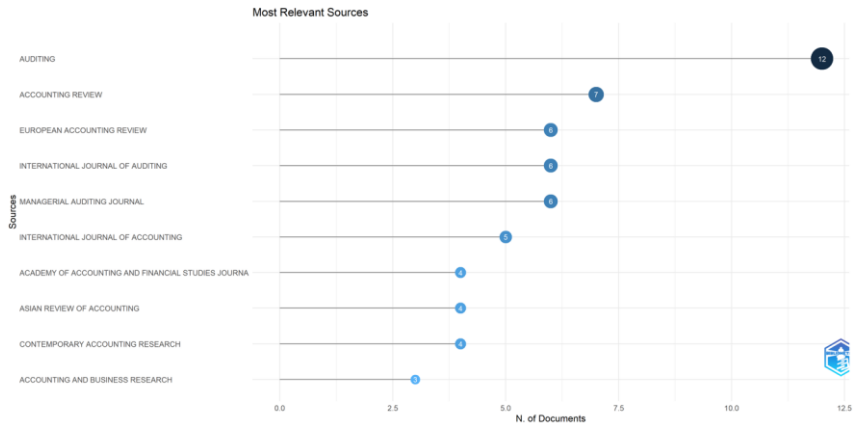

Figure 3. Most frequent sources in academic publications.

On the other hand, with the use of important bibliometric indicators, citation metrics, and publication histories, **Table 3** offers a thorough analysis of a variety of academic sources around Intellectual Capital and Audit Quality in the Audit Market.

Table 3. Impact of academic sources in the field.

Element	*H* index	*G* index	*M* index	*TC*	*NP*	PY start
Auditing	6	12	0.667	223	12	2015
Accounting Review	5	7	0.625	203	7	2016
European Accounting Review	5	6	0.625	107	6	2016
Asian Review of Accounting	4	4	0.5	80	4	2016
Contemporary Accounting Research	4	4	0.5	147	4	2016
Managerial Auditing Journal	4	6	0.5	39	6	2016
Accounting Horizons	3	3	0.429	52	3	2017
International Journal of Accounting	3	5	0.375	44	5	2016
Journal of Accounting Research	3	3	0.375	66	3	2016
Accounting in Europe	2	2	0.222	31	2	2015
Accounting Research Journal	2	2	0.333	15	2	2018
Advances in Accounting	2	2	0.222	26	2	2015
Australian Accounting Review	2	2	0.25	7	2	2016
International Journal of Auditing	2	3	0.286	12	6	2017
Journal of Accounting and Public Policy	2	2	0.286	36	2	2017
Journal of Financial Reporting and Accounting	2	2	0.333	19	2	2018
Journal of International Accounting Research	2	2	0.4	7	2	2019
Journal of International Accounting, Auditing and Taxation	2	2	0.222	109	2	2015
Academy of Accounting and Financial Studies Journal	1	1	0.111	2	4	2015

The table's components are as follows:

- *H*-Index: The number of articles (h) with at least h citations is used to calculate the productivity and influence of a source.
- *G*-index: The influence of a source's highly cited articles is measured by this index.
- *M*-index: The M-index reveals the harmony between the volume of papers produced and the influence of their citations.
- Total Citations (*TC*): The total number of citations that the source's articles have gotten.
- *NP*: The number of articles the source has published.
- PY start: The year when the source's record of publications begins.

The source Auditing stands out among the others with an impressive *h*-index of 6223 total citations for its 12 articles published since 2015. Similar to this, Accounting Review and European Accounting Review have both gotten 203 and 107 citations, respectively, and both have significant *h*-indices of 5. Even if some sources have lower *h*-indices, their m-indices show that they have a balanced influence. For example, the Journals Asian Review of Accounting and Contemporary Accounting Research both have *m*-indices of 0.5, indicating that their publications have gotten a lot of citations in comparison to how many of them were published (80 citations for 4 articles and 147 citations for 4 articles, respectively).

Certain sites, with comparatively lower *h*-indices but more articles, place a stronger emphasis on prolific publication. For instance, Managerial Auditing Journal which contains 6 articles published since 2016, has a *g*-index of 6.

However, despite having fewer articles and lower h-indices, sources like Accounting Horizons and International Journal of Accounting have articles that have a significant impact on citations compared to their

small numbers (52 citations for 3 articles and 44 citations for 5 articles, respectively). In the area of Intellectual Capital and Audit Quality in the Audit Market, **Table 3** demonstrates the varied influence and productivity of academic sources. It gives researchers useful information to evaluate the impact of different sources and indicate prospective areas for further study.

In addition, an extensive examination of the citation effect and international recognition of a few key scholarly papers in the area of Intellectual Capital and Audit Quality is given in **Table 4**. The table contains details on the document's DOI, the total number of local and worldwide citations, the *LC*/*GC* Ratio (the proportion of local to global citations), and the normalised global citations.

Table 4. Citation impact and global recognition of selected documents in the field of intellectual capital and audit quality.

Document	Doi	Local citations	Global citations	Normalized global citations
NEWTON NJ, 2016, ACCOUNT REV	10.2308/accr-51149	1	74	1.91
BECK MJ, 2018, CONTEMP ACCOUNT RES	10.1111/1911-3846.12344	0	31	2.67
MALO A, 2020, AUST ACCOUNT REV	10.1111/auar.12297	0	4	0.68
BILLS KL, 2018, ACCOUNT REV	10.2308/accr-52003	0	25	2.15
REHEUL A-M, 2017, MANAGE AUDIT J	10.1108/MAJ-01-2016-1296	0	4	0.22
JOHL SK, 2021, INT J AUDIT	10.1111/ijau.12230	0	6	1.52
ALHADAB M, 2018, J FINANC REP ACCOUNT	10.1108/JFRA-07-2017-0050	0	13	1.12
ASTHANA S, 2018, INT J ACCOUNT AUDIT PERFORM EVAL	10.1504/IJAAPE.2018.091066	0	4	0.34
GAL-OR E, 2022, EUR ACC REV	10.1080/09638180.2021.1890631	0	5	3.48
QUICK R, 2018, J MANAGE GOV	10.1007/s10997-017-9386-4	0	18	1.55
BLAY AD, 2019, J BUS ETHICS	10.1007/s10551-017-3561-z	0	14	1.41
QI Y, 2023, CHINA J ACCOUNT RES	10.1016/j.cjar.2022.100284	0	0	0.00
CHEN KCW, 2022, J ACCOUNT RES	10.1111/1475-679X.12399	0	3	2.09
CLARINA M, 2019, JURNAL PENGURUSAN	-	0	2	0.20
LESAGE C, 2017, EUR ACC REV	10.1080/09638180.2016.1152558	0	31	1.72
OCAK M, 2019, MANAGE AUDIT J	10.1108/MAJ-12-2017-1756	0	5	0.50
ABID A, 2018, INTERN J FINANCIAL STUD	10.3390/ijfs6020058	0	22	1.89
PAN Y, 2023, J ACCOUNT ECON	10.1016/j.jacceco.2022.101520	0	24	7.54
FENG NC, 2017, J ACCOUNT PUBLIC POLICY	10.1016/j.jaccpubpol.2017.07.002	0	5	0.28

Table 4. (*Continued*).

Document	Doi	Local citations	Global citations	Normalized global citations
LAM KCK, 2021, ACCOUNT BUS RES	10.1080/00014788.2021.1951645	0	1	0.25
BUSLEPP W, 2018, MANAGE AUDIT J	10.1108/MAJ-10-2017-1666	0	3	0.26
CHAPMAN K, 2023, REV ACCOUNT STUD	10.1007/s11142-021-09635-3	0	1	0.31
KHAKSAR J, 2022, J PUBLIC AFF	10.1002/pa.2780	0	2	1.39
VAN DER ZAHN JLWM, 2023, INT J AUDIT	10.1111/ijau.12300	0	0	0.00
COWLE EN, 2022, ACCOUNT REV	10.2308/TAR-2019-0557	0	1	0.70

The table displays several documents together with their citation counts. It is noteworthy that certain publications have a high number of global citations but no local citations, indicating that they have been extensively mentioned by academics from other areas or institutions outside of their nation of origin. For instance, Newton NJ, 2016, Account Rev has an astounding 74 worldwide citations, making it well acknowledged and significant in the academic community.

However, several texts have been cited both locally and internationally, with various levels of significance. For example, Pan Y, 2023, J Account Econ has an impressive 24 global citations and 0 local citations, showing strong worldwide recognition despite little local attention. The Qi Y, 2023, China J Account Res and Van Der Zahn Jlwm, 2023, Int J Audit entries, however, show that certain papers have not been cited at all, either nationally or internationally. This may imply that these materials are recent or that the academic community hasn't given them much attention yet, depending on the case. The normalised global citations shed light on each document's significance in relation to the sum of its local and global citations. Despite having few local citations, several papers, such as Pan Y, 2023; J Account Econ, Pan Y 2023; J Account Econ and Newton NJ, 2016; Account Rev have unusually high normalised global citation values.

Overall, **Table 4** offers insightful data on the scope and significance of certain papers in the areas of Intellectual Capital and Audit Quality. It gives academics a crucial perspective on the value of academic contributions in this discipline on a worldwide scale by enabling them to evaluate the international distribution and acknowledgment of research findings.

This study used a methodical two-stage methodology to perform an extensive literature review, assuring the validity, correctness, and completeness of the information gathered. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), a widely used and acknowledged systematic review methodology, was used in the first stage[24]. The implementation of the PRISMA framework made it easier to pull pertinent data from a variety of sources, resulting in a thorough examination of the literature[25].

On the collected data, descriptive and scientometric analyses were then carried out. To provide insights into the topic matter, techniques, and publication trends, descriptive analysis was used to summarise the major traits and trends found in the literature. In order to look into the links and interconnections between different study areas, the centrality and co-occurrence of words were also looked at. These studies made use of the R programming language, which made it possible to find key research clusters and visualise how they relate to one another.

To gather relevant literature pertaining to each study field, content analysis was performed on each

research cluster that was discovered through the analysis. To fully comprehend the research topics and themes, a thorough analysis of the data inside each cluster was required. For a deeper understanding of the study issues, content analysis entails the methodical classification, organisation, and synthesis of data. By using this methodical two-stage strategy, the study hoped to assure rigour and correctness in the literature review process and acquire insightful information on the key characteristics and linkages between various research topics within the study's area of interest. The robustness and dependability of the findings are enhanced using well-established procedures like PRISMA, scientometric analysis, and content analysis, which also increases the research's relevance and usefulness to the academic community.

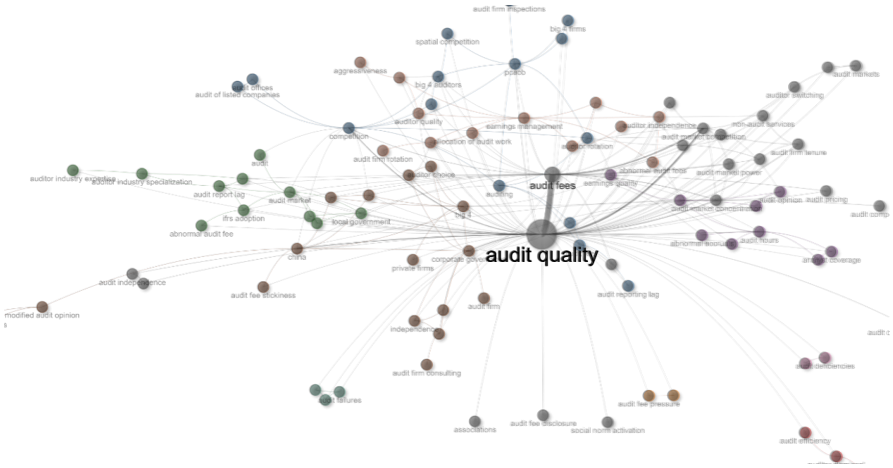

Figure 4. Thematic map.

Furthermore, the topic of research was chosen as the keyword plus during the building of the thematic map and examination of its progression[26]. To achieve the best results, the word count was limited to 50 to 300, allowing for thorough research[27,28]. Two labels were given to each cluster on the thematic map, and the minimum cluster frequency of 15 per 1,000 documents was chosen as the criteria. The theme map's visibility was improved by shrinking the label size to 0.03. It is crucial to keep in mind that the tool itself determines the relative size unit of the map, with 1 being the biggest size. The final thematic map, which makes use of an axis based on density and centrality, is shown in **Figure 5**. Like **Figures 4** and **5** are a thematic map that shows how themes are distributed based on their density and centrality. Emerging or diminishing themes, motor themes, basic themes, and specialty topics are arranged in four quadrants on the map. Horizontal and vertical dotted lines serve as dividers, segregating the thematic map into these distinct quadrants.

Specific subjects are categorised in the thematic map correspondingly. For instance, the words "Auditor dismissal", "hours", "effort", and "opinion" are examples of subjects that are in decline or developing. In contrast, the main themes quadrant is where "Audit quality", "Audit fees" and "Audit Market Competition" are found. In the niche theme quadrant, the themes "audit market", "audit report" and "auditor industry expertise" are prominent, while "corporate governance" is in the motor theme quadrant. Additionally, between the specialty theme and motor theme quadrants, images of specific subjects like "earning management", "abnormal audit fee" and "auditor independence" may be seen. **Figure 5** shows the patterns and linkages over time among the major study areas and illustrates how the results have evolved thematically.

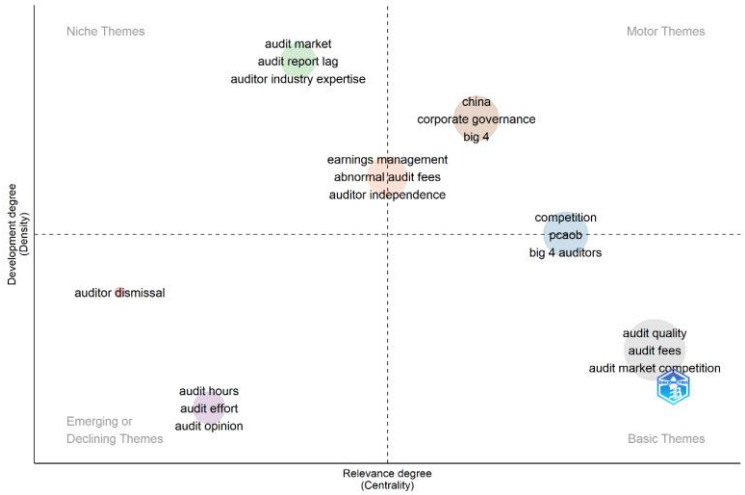

Figure 5. Thematic evolution.

Although, in **Table 5**, the academic fields of Intellectual Capital and Audit Quality are examined in-depth about theme clusters using metrics like Callon Centrality, Callon Density, Rank Centrality, Rank Density, and Cluster Frequency. The **Table 5** displays several theme groupings and the values for each statistic for each cluster. The "auditor dismissal" cluster is ranked first in Centrality and third in Density with a Callon Centrality of 0 and a Callon Density of 50. The Cluster Frequency of this cluster is 2. The "competition" cluster is ranked sixth in Centrality and fourth in Density with a Callon Centrality of 0.851 and a Callon Density of 52.698. This cluster has a 33 Cluster Frequency, which is a comparatively higher value. In addition, the "audit market" cluster is ranked third in both centrality and density, with a Callon Centrality of 0.25 and a Callon Density of 72.619. The frequency of this cluster's clusters is 15. The cluster "audit hours" has a Callon Centrality of 0.083 and a Callon Density of 44.444. This gives the cluster a Centrality rank of 2 and a Density rank of 1. In 12 papers, this cluster may be found. With a Callon Centrality of 0.805 and a Callon Density of 56.212, the "China" cluster comes in fifth in Centrality and sixth in Density. The Cluster Frequency of 34 for this cluster is significant.

Table 5. Thematic clusters analysis in the field of intellectual capital and audit quality.

Cluster	Callon centrality	Callon density	Rank centrality	Rank density	Cluster frequency
Auditor dismissal	0	50	1	3	2
Competition	0.851190476	52.6984127	6	4	33
Audit market	0.25	72.61904762	3	7	15
Audit hours	0.083333333	44.44444444	2	1	12
China	0.805555556	56.21212121	5	6	34
Audit quality	1.193233404	44.92222103	7	2	127
Earnings management	0.272222222	53.47222222	4	5	23

The "audit quality" cluster, which ranks second in Callon Density and seventh in Callon Centrality, exhibits a high Callon Centrality of 1.193. With 127 occurrences, this cluster has the highest Cluster Frequency of any cluster. The "earnings management" cluster, which ranks fourth in Centrality and fifth in Density, has a Callon Centrality of 0.272 and a Callon Density of 53.472. The Cluster Frequency of this cluster is 23. The information in **Table 5** on the centrality, density, and recurrence of different theme clusters around intellectual capital and audit quality is quite helpful. Researchers may evaluate the significance and frequency of these clusters, which aids in developing a more comprehensive picture of the research environment in this field.

Furthermore, study discussed the clusters in detail for the better understanding of the outcomes from the literature. In addition, the statistical findings of theme word clusters in the academic fields of Intellectual Capital and Audit Quality are shown in **Table 6**. Each word cluster's metrics are listed in the table, including Occurrences, Cluster, Cluster Label, Betweenness Centrality (btw centrality), Closeness Centrality (clos centrality), and PageRank Centrality (page rank centrality). In addition, words associated with the field's competitive environment are found in Cluster 1, which is tagged as "competition". The term "competition" is used seven times, followed by "PCAOB" (six times) and "big 4 auditors" (four times). The "competition" cluster has a betweenness centrality of 300.757, demonstrating the importance of this word in tying together other terms in the cluster.

Table 6. Statistical results of thematic word clusters in the field of intellectual capital and audit quality.

Words	Occurrences	Btw centrality	Clos centrality	Page rank centrality
competition	7	300.757808	0.00403226	0.02599882
PCAOB	6	156.861414	0.004	0.01784021
big 4 auditors	4	202.836219	0.00469484	0.01287664
auditing	3	164.209703	0.00471698	0.01179058
auditor rotation	3	69.1182496	0.00377358	0.01334139
audit committee	2	152.269923	0.00454545	0.00810956
audit fee	2	4.90012569	0.00341297	0.00605656
audit reporting lag	2	16.2340521	0.00389105	0.00442069
big 4 firms	2	13.6380952	0.00409836	0.00553723
spatial competition	2	13.6380952	0.00416667	0.00518448
audit market	3	98.4337038	0.003861	0.01464695
audit report lag	2	72.3233761	0.00444444	0.00941406
auditor industry expertise	2	19.0639527	0.00389105	0.00444242
auditor industry specialization	2	2.59948467	0.00318471	0.00613324
auditor reputation	2	65.4015318	0.00438596	0.00803039
IFRS adoption	2	12.75	0.00374532	0.0092029
local government	2	14.156936	0.0041841	0.0080748
audit hours	4	31.0755051	0.003367	0.01565783
audit effort	3	78.0233341	0.003663	0.01138073
audit opinion	3	10.441804	0.00332226	0.00877069
earnings quality	2	61.7485594	0.00369004	0.00726107

Cluster 2, dubbed "audit market" focuses on terms related to the environment of the audit market. There are three instances of the phrase "audit market" in this document, along with the terms "audit report lag", "auditor industry expertise" and "auditor reputation". This cluster's betweenness centrality is 98.434, which highlights its function as a connection inside the cluster. Additionally, Cluster 3, dubbed "audit hours" contains phrases that refer to effort and audit hours. Following "audit hours" with four instances is "audit effort" with three and "audit opinion" with two occurrences each. This cluster's betweenness centrality, which measures how well words connect to one another inside the cluster, is 31.076. The closeness centrality calculates how close each word is to the others in the cluster. For instance, the term "audit fee" has a closeness centrality of 0.003 in the "competition" cluster, suggesting that it is quite near to other words in the same cluster.

Additionally, each word's influence inside the cluster is represented by its PageRank centrality. For

instance, the term "audit report lag" has a PageRank centrality of 0.009 in the "audit market" cluster, indicating that it has a greater effect there.

In addition, with a focus on the Chinese environment, **Table 7** presents a statistical analysis of theme word clusters in the areas of intellectual capital and audit quality. There are several metrics listed in the table for each word cluster, including Occurrences, Cluster Label, Betweenness Centrality (btw centrality), Closeness Centrality (clos centrality), and PageRank Centrality (page rank centrality). Words pertaining to many facets of the Chinese setting are included in the "China" cluster. The word "China" is used six times in total, highlighting its importance to the cluster. This cluster also contains the phrases "corporate governance" and "big 4", which are used 6 and 5 times, respectively. This cluster's betweenness centrality is 412.124, which indicates that it plays a significant role in tying together other terms in the cluster.

Table 7. Statistical analysis of thematic word clusters in the context of intellectual capital and audit quality in China.

Words	Occurrences	Btw centrality	Clos centrality	Page rank centrality
China	6	412.124033	0.00431034	0.01851333
corporate governance	6	286.886388	0.00406504	0.02105351
big 4	5	148.360715	0.00357143	0.01670285
independence	3	0	0.00337838	0.00825978
audit market structure	2	146.427389	0.00425532	0.00957592
auditor choice	2	18.9141442	0.00322581	0.00691431
Germany	2	34.6045	0.00369004	0.0087002
modified audit opinion	2	188	0.00309598	0.00867722
non-big 4	2	22.9787682	0.00395257	0.00985415
private firms	2	2.14906658	0.00328947	0.00504606

The word "independence" which appears three times, makes up the "independence" cluster. This cluster's betweenness centrality is zero, suggesting that it only plays a little part in tying together other words in the cluster.

The phrase "audit market structure" appears twice in the "audit market structure" cluster, which also contains phrases associated with the organisation of the Chinese audit market. This cluster's betweenness centrality is 146.427, which reflects its function in tying together other words in the cluster. The term "auditor choice" appears twice in the "auditor choice" cluster, which also contains other words that are pertinent to auditor selection. This cluster's betweenness centrality is 18.914, indicating that it serves as a link between other terms in the cluster. The word "Germany," which appears twice, is also part of the "Germany" cluster. This cluster's betweenness centrality is 34.605, which indicates that it serves as a link between other terms in the cluster. **Table 7** offers useful information on the frequency and importance of word clusters with certain themes in the context of Intellectual Capital and Audit Quality in China. To have a thorough picture of the research landscape in this context, it enables researchers to comprehend the prevalence and interrelationships of distinct terms inside each cluster.

In the context of Intellectual Capital and Audit Quality, **Table 8** provides a thorough examination of thematic word clusters with an emphasis on the term "audit quality." For each word cluster associated to audit quality, the table offers a variety of metrics, including Occurrences, Cluster, Cluster Label, betweenness centrality (btw centrality), closeness centrality (clos centrality), and PageRank centrality (page rank centrality). Words directly connected to audit quality are included in the "audit quality" cluster. 68 different instances of the word "audit quality" are found in the cluster, demonstrating its substantial importance. Audit fees, which

occur 21 times in this cluster, audit market competition, which occurs 9 times, and audit market concentration, which occurs 8 times, are further pertinent words. The "audit quality" cluster's strong betweenness centrality of 2711.385 demonstrates its critical significance in linking with other clusters.

Table 8. Thematic word clusters analysis: Influence of audit quality in the domain of intellectual capital and audit quality.

Words	Occurrences	Btw centrality	Clos centrality	Page rank centrality
audit quality	68	2711.38492	0.00609756	0.18668667
audit fees	21	724.717609	0.00471698	0.06968621
audit market competition	9	54.5937176	0.00364964	0.02412542
audit market concentration	8	206.465106	0.00393701	0.0231575
audit firm tenure	3	29.5896182	0.00315457	0.00994427
audit market regulation	3	33.3986826	0.00361011	0.01197108
non-audit services	3	13.3861111	0.00333333	0.0073786
audit markets	2	1.15980392	0.00398406	0.00595943
audit pricing	2	0	0.00327869	0.00491988
auditor switching	2	43.1040951	0.00440529	0.0065302
mandatory audit firm rotation	2	53.3981042	0.00389105	0.00841667
misstatements	2	11.5049862	0.00332226	0.00620448
social norm activation	2	0	0.00282486	0.00386294

Additionally, the term "audit firm tenure" appears three times in the cluster of words relating to the tenure of audit companies. This cluster's betweenness centrality, which measures how well words connect to one another inside the cluster, is 29.590. In addition, phrases relating to the audit market's regulatory features are found in the "audit market regulation" cluster, where "audit market regulation" appears three times. This cluster's betweenness centrality, which indicates how well it links to other words in the cluster, is 33.399. Also, the "non-audit services" cluster is made up of terms related to those services, with the phrase "non-audit services" occurring three times. This cluster's betweenness centrality is 13.386, suggesting that it serves as a link between other terms in the cluster. The results of this research provide information on the importance and connections among word clusters related to "audit quality" around Intellectual Capital and Audit Quality. This knowledge may be used by researchers to better understand the predominance and significance of particular words and concepts within this important area of the study domain.

Finally, an extensive examination of theme word clusters related to "earnings management" in the areas of Intellectual Capital and Audit Quality is shown in **Table 9**. For each word cluster linked to earnings management, the table provides multiple metrics, including Occurrences, Cluster, Cluster Label, betweenness centrality (btw centrality), closeness centrality (clos centrality), and PageRank centrality (page rank centrality). The terms in the "earnings management" cluster are all related to the activity of managing earnings. Five different instances of the word "earnings management" are found in the cluster, demonstrating its importance. The phrases "abnormal audit fees", "auditor independence", "discretionary accruals", and "real earnings management", each occurring three times, are additional pertinent terms in this cluster. The "earnings management" cluster's betweenness centrality of 114.296 points to its function as a connection for the cluster.

The "auditor quality" cluster also includes terms that are connected to the calibre of auditors, with "auditor quality" occurring twice. This cluster's betweenness centrality, which indicates how well it links to other words in the cluster, is 23.626. Additionally, phrases related to joint audit engagements are included in the "joint audit" cluster, with "joint audit" occurring twice. This cluster's betweenness centrality is 155.831, indicating

that it plays a substantial role in tying together other terms in the cluster. Additionally, terms associated with small audit companies are included in the "small audit firms" cluster, with "small audit firms" occurring twice. This cluster's betweenness centrality, which measures how well words connect to one another inside the cluster, is 63.861.

Table 9. Thematic word clusters analysis: Earnings management and its impact on intellectual capital and audit quality.

Words	Occurrences	Btw centrality	Clos centrality	Page rank centrality
earnings management	5	114.295906	0.00406504	0.01770054
abnormal audit fees	3	11.2509358	0.00333333	0.00977429
auditor independence	3	34.1549402	0.0035461	0.01108272
discretionary accruals	3	6.182818	0.00346021	0.00937804
real earnings management	3	38.4726454	0.00373134	0.01013081
auditor quality	2	23.6262626	0.00357143	0.00671771
joint audit	2	155.831379	0.00456621	0.00959674
small audit firms	2	63.8606825	0.00421941	0.00626972

The results of the **Table 9** provide important information on the frequency and importance of thematic word clusters associated with "earnings management" in the context of Intellectual Capital and Audit Quality. This information may be used by researchers to better comprehend the importance and connections between terms and concepts while studying how profits management affects the research topic.

4. Discussion

This study's major goal is to thoroughly analyse how intellectual capital and audit quality interact in the audit market. The goal of the study is to pinpoint the elements and processes that intellectual capital uses to improve audit quality. In addition, the methodology employed in this study aims to thoroughly investigate the relationship between intellectual capital and audit quality. The study utilises PRISMA to implement a systematic and clear approach to conducting a literature review. Thematic analysis is a valuable tool for identifying and understanding the key factors that impact the quality of audits. The insights obtained from this research have significant implications for both theoretical advancements in auditing literature and practical implementations for auditors, policymakers, and stakeholders within the financial reporting ecosystem. The study also intends to evaluate how important intellectual capital is in determining how competitive auditing companies are in the audit market and what that means for the general dependability and trustworthiness of audit services. Understanding the link between these two important aspects that influence the efficiency of the auditing process requires a consideration of intellectual capital and audit quality in the context of the audit market. The details from the prior dialogue illustrate various aspects of intellectual capital, audit quality, and the audit market, illuminating their interactions and importance in the auditing industry. First, as the study's subtitle "Intellectual Capital and Audit Quality Based on the Audit Market" denotes, its goal is to investigate the relationship between intellectual capital and audit quality in the context of the audit market. The researchers may be interested in examining how the availability of intellectual capital inside auditing companies may affect the general calibre of audit services offered in the highly competitive audit market, according to this indication.

The methodical two-stage approach used for the literature review, as mentioned in the paragraph, highlights the accuracy and completeness of the data gathered[29]. The researchers secured thorough coverage of pertinent literature from various sources by using the PRISMA technique, a widely used systematic review methodology, which raised the study's credibility and robustness[30]. In addition, the data includes 126 papers

from 60 sources (books, Journals, etc.) and covers the years 2015 through 2023. A decline in publications over time is shown by the yearly growth rate of -1.08, which may be important for identifying trends and changes in the industry. The yearly output of articles provides information about historical publication patterns. Every year, the number of papers published varies, reaching a high in 2016 and then gradually declining after that. These patterns may reflect the scientific interest and concentration at various times.

The number of papers produced by the sources listed varies, with "AUDITING", "ACCOUNTING REVIEW" and "EUROPEAN ACCOUNTING REVIEW" being the top three sources in terms of article production. This suggests that the study on intellectual property and audit quality is well-known and often disseminated in these publications. Additionally, the influence of sources based on many metrics, including h index, g index, and m index, as well as *TC* (Total Citations), *NP* (Number of Publications), and PY start (Publication Year Start). Researchers can evaluate the effect and impact of sources on the academic landscape using this data. The worldwide and local citations of publications, however, help scholars comprehend the scope and significance of certain articles within the context of intellectual capital and audit quality[16].

Moreover, the statistical findings and clusters were associated with topics, such as "audit quality" and "earnings management" respectively. Researchers may use these tables to uncover key ideas and topics in the context of the audit market by learning more about the frequency and centrality of terms within each cluster. Intangible resources and knowledge-based resources that provide an organisation value, a competitive edge, and the capacity to generate value for stakeholders are referred to as intellectual capital[31]. Intellectual capitals are particularly important in the context of auditing because it has a direct impact on the calibre of audit services offered by auditing companies in the cutthroat audit market[15]. In addition, the study's goal, to discover how its existence and utilisation inside auditing businesses influence the overall quality of audit services, further emphasises the relevance of intellectual capital[32]. The researchers want to throw light on how auditors may strategically exploit their knowledge-based resources to increase the efficacy and reliability of their audit engagements by concentrating on intellectual capital in the context of the audit market[33].

In addition, Intellectual capital's importance in boosting audit quality and competitiveness in the audit market is highlighted by the discussion of intellectual capital in the context of the study issue[12]. Intellectual capital is a vital resource for auditing companies because it may improve audit services, promote confidence and openness in financial reporting, and aid auditors in adjusting to the always changing difficulties of the audit market[34]. In addition to adding to academic understanding of auditing, the research on intellectual capital is anticipated to have practical ramifications for auditors and policymakers looking to maximise their intellectual capital resources for providing high-quality audit services[35].

5. Conclusion

The study "Intellectual Capital and Audit Quality Based on the Audit Market" offers valuable insights into the complex connection between intellectual capital, audit quality, and the competitive audit market. The results highlight the importance of intellectual capital as a valuable resource that has a significant influence on the effectiveness and dependability of audit services in auditing firms. The research employs a systematic two-stage process to ensure the validity and thoroughness of its analysis. It utilises the PRISMA approach for literature review.

The primary objective of the study is to investigate the impact of intellectual capital on audit quality in the audit market. This research has significant implications for further research in the field. The identification of thematic word clusters related to "audit quality" and "earnings management" allows auditors to gain a deeper understanding of important concepts and factors associated with intellectual capital, which can have a positive impact on audit outcomes. The effective utilisation of intellectual capital is crucial for auditing

businesses as it allows them to improve audit quality, protect their reputation, and gain a competitive advantage in the ever-changing audit industry.

Additionally, the study highlights the importance of consistently improving intellectual capital resources in auditing firms. Auditors are advised to prioritise the development of knowledge-based skills, cutting-edge technology, and human capital in order to effectively respond to changing client needs and regulatory demands. This approach enables auditors to establish high standards for delivering exceptional audit services and sustaining their market leadership.

The analysis of popular sources and important papers on intellectual capital and audit quality provides a useful guide for researchers and professionals to stay updated on recent progress in these areas. The mentioned sources have the potential to provide valuable guidance for conducting further investigation and developing evidence-based audit procedures that take into account intellectual capital.

The study's findings provide valuable insights into the changing importance of intellectual capital in the field of auditing, contributing to the academic understanding of this topic. Given the ever-changing and competitive nature of the audit market, it is imperative for auditors, policymakers, and stakeholders in the financial reporting ecosystem to recognise the significance of intellectual capital in improving audit quality and competitiveness. The significance of fostering intellectual capital growth within auditing companies should be acknowledged and supported by audit regulators and policymakers, considering its practical implications. The implementation of a culture that encourages knowledge sharing, the allocation of resources towards training and development initiatives, and the promotion of advanced audit procedures can all contribute to improving the quality of audits and bolstering the credibility of financial reporting.

Several research limitations should be considered. First, using publishing data may skew the results since academic works may not completely describe the Audit Market's complex dynamics. The research only covers English literature, which may exclude pertinent non-English literature. Also difficult is the variety in quality and rigour of included papers. The dynamic audit environment and changing intellectual capital notion may result in a picture that may not completely reflect emerging trends. Despite its limits, the study delivers useful insights within its constraints, laying the groundwork for future research and adding to the academic debate on intellectual capital and audit quality in the audit market.

Author contributions

Conceptualization, CM and DFA; methodology, CM and SFAK; validation, DFA and NI; formal analysis, MC and SFAK; investigation, CM and SFAK; resources, CM and DFA; data curation, CM; writing—original draft preparation, CM; writing—review and editing, CM and SFAK; visualization, CM; supervision, DFA and NI; project administration, DFA and NI. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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