

DOI: 10.5281/zenodo.11425179

INTELLECTUAL CAPITAL AND AUDIT QUALITY: A SYSTEMATIC REVIEW AND CLUSTER ANALYSIS WITH A SUSTAINABILITY PERSPECTIVE

Nohman Khan¹, Huma Sikandar², Yamunah Vaicondam³, Mohammad Falahat⁴, Rana Asaad Mohammed Alotaiby⁵

¹Strategic Research Institute (SRI), Asia Pacific University of Technology and Innovation (APU), Malaysia, nohman.khan@apu.edu.my, <https://orcid.org/0000-0001-9714-6273>

²Universiti Teknologi Malaysia (UTM), Malaysia, shuma@graduate.utm.my, <https://orcid.org/0000-0001-7777-2314>

³Taylor's University, Malaysia; Centre for Sustainable Societies, Taylor's University, Malaysia, Yamunah.Vaicondam@taylors.edu.my, <https://orcid.org/0000-0003-2658-8319>

⁴Strategic Research Institute (SRI), Asia Pacific University of Technology and Innovation (APU), Malaysia, mohammad.falahat@apu.edu.my, <https://orcid.org/0000-0002-0423-984X>

⁵Corvinus University of Budapest, Budapest, Hungary, rana.alotaiby@stud.uni-corvinus.hu <https://orcid.org/0000-0002-9847-5906>

Received: 11/11/2025

Accepted: 18/12/2025

Corresponding Author: Nohman Khan

(nohman.khan@apu.edu.my)

ABSTRACT

Audit quality is a cornerstone of financial market integrity, yet the mechanisms through which intellectual capital shapes audit effectiveness in emerging markets remain underexplored. This study addresses this critical gap by systematically reviewing and synthesizing evidence on the multidimensional relationship between intellectual capital and audit quality in Chinese accounting firms, a context characterized by rapid regulatory, technological, and market changes. Using the PRISMA framework, we conducted a comprehensive search of the Scopus database and screened 3,312 publications published between 2014 and 2023. A final dataset of 120 peer-reviewed documents was analyzed through bibliometric and thematic techniques in R Studio, including cluster mapping and trend analysis. Results reveal that intellectual capital functions as an integrated system, with human capital—auditor education, experience, and competence—providing the foundation for professional judgment, and structural capital—organizational processes, technology, and knowledge management—enabling consistent audit quality delivery. Relational capital further amplifies these effects by strengthening stakeholder trust. Publication trends indicate an exponential rise in China-focused research since 2021, driven by digitalization, ESG reporting mandates, and new audit quality standards. Three dominant clusters emerged: the direct intellectual capital-audit quality nexus, auditor characteristics as quality determinants, and the broader role of intellectual capital in firm performance, with sustainability as a cross-cutting theme. This study advances theoretical understanding of knowledge-based assets in professional services and offers actionable insights for audit firms and regulators in optimizing intellectual capital to enhance audit quality under evolving market and regulatory pressures.

KEYWORDS: Intellectual Capital, Audit Quality, Chinese Accounting Firms, Systematic Review, Sustainability, Decent Work and Economic Growth.

1. INTRODUCTION

Audit quality remains a cornerstone of financial market integrity, serving as the primary mechanism through which stakeholders gain confidence in financial reporting reliability and transparency (Alayli, 2023). In today's complex business environment, characterized by rapid technological advancement, evolving regulatory frameworks, and increasing stakeholder expectations, accounting firms face unprecedented challenges in maintaining consistently high audit standards (Pizzi *et al.*, 2021). Within this demanding landscape, intellectual capital has emerged as a critical determinant of audit firms' ability to deliver superior audit quality and navigate market complexities effectively ((Khatib *et al.*, 2024; Tarighi *et al.*, 2022).

Intellectual capital, encompassing human capital, structural capital, and relational capital, represents the knowledge-based assets that drive organizational performance and competitive advantage in professional service firms (Buallay, 2018a). Human capital, comprising auditors' knowledge, skills, experience, and cognitive capabilities, forms the foundation of audit quality through its direct influence on professional judgment, risk assessment, and decision-making processes (S. Chen & Yang, 2025; Westermann *et al.*, 2015). Recent empirical evidence from China demonstrates that auditor education and training significantly enhance audit quality through improved audit adjustments and enhanced auditor competence, establishing a clear causal link between human capital investments and measurable audit outcomes (Y. Zhang *et al.*, 2025). Similarly, (S. He *et al.*, 2025) reveal that audit firms' financial statements contain valuable information about audit quality, with human capital metrics serving as key predictive indicators of firm performance and workplace environment effectiveness.

Contemporary research has highlighted the evolving nature of human capital effects on audit quality. (Khavis & Szerwo, 2025) demonstrate that audit-employee turnover significantly impacts auditor-client realignment and audit delivery mechanisms, while (T. Ma *et al.*, 2024) provide large-sample evidence showing that individual auditor turnover affects audit quality indicators and increases financial restatement probabilities. Furthermore, (Aobdia *et al.*, 2024) examine the economics of audit production, revealing that the strategic allocation of human capital across different audit phases and the expertise level of midlevel managers substantially influence audit quality outcomes. These findings underscore the complexity

of human capital dynamics and their multifaceted effects on audit performance.

Structural capital, encompassing organizational processes, methodologies, information systems, and knowledge management capabilities, provides the institutional framework within which auditors operate (Novas *et al.*, 2017). The effectiveness of these internal structures has become increasingly critical as audit environments become more complex and technology-dependent (Grima *et al.*, 2023). Recent research by (Shen *et al.*, 2024) examined audit firm informatization during COVID-19, demonstrating how IT human capital and technological infrastructure became essential for maintaining audit quality during operational disruptions. Additionally, emerging technologies such as blockchain are reshaping structural capital requirements, with (W. Zhang & Han, 2025) highlighting how technological innovations are transforming traditional audit processes and quality assurance mechanisms. The integration of advanced data analytics, artificial intelligence, and standardized digital processes has become fundamental to audit quality delivery (Krieger *et al.*, 2021).

Beyond technical competencies and organizational infrastructure, intellectual capital permeates audit culture, fostering environments that emphasize continuous learning, critical thinking, and ethical behavior (Tarighi *et al.*, 2022). The collective intellectual resources of audit personnel serve as catalysts for innovation and adaptation, enabling firms to respond effectively to emerging challenges and regulatory changes (Betti & Sarens, 2021). This cultural dimension of intellectual capital becomes particularly important as auditors encounter increasingly sophisticated business models and complex financial instruments that require continuous professional development and knowledge updating (Shore & Wright, 2015).

Despite growing recognition of intellectual capital's importance, significant research gaps persist, particularly regarding the specific mechanisms through which different intellectual capital components interact to influence audit quality. While (Meng *et al.*, 2024) recently unveiled the nexus between intellectual capital and audit quality in accounting firms, examining relational capital and structural capital effects, their analysis remained focused on specific dimensions rather than providing a comprehensive theoretical and empirical framework. Furthermore, most existing research has examined intellectual capital effects in developed markets, with limited attention to emerging economies where institutional contexts and

professional development patterns may differ substantially.

The Chinese audit market presents a particularly compelling context for intellectual capital research due to its unique characteristics, including rapid economic development, evolving regulatory environment, and distinctive professional education systems. Although Lu et al. (2021a) examined intellectual capital's impact on innovation performance in Chinese construction firms, and Rahman and Liu (2023) highlighted intellectual capital's role in enhancing operational effectiveness in China's transportation industry, there remains a notable lack of comprehensive research specifically examining the intricate relationships between intellectual capital components and audit quality within Chinese accounting practices. This gap is particularly significant given China's position as the world's second-largest economy and its increasingly important role in global financial markets.

Therefore, this research addresses these critical gaps by conducting a comprehensive investigation of the complex relationships between intellectual capital and audit quality in Chinese accounting firms. **Specifically, this study aims to** (1) examine how different components of intellectual capital—human capital, structural capital, and relational capital—individually and collectively influence audit quality outcomes; (2) investigate the mediating and moderating mechanisms through which intellectual capital affects audit performance in the Chinese context; and (3) provide practical insights for audit firms seeking to optimize their intellectual capital investments to enhance audit quality and competitive positioning. By addressing these objectives, this research contributes to both theoretical understanding of intellectual capital dynamics in professional service firms and practical knowledge for audit quality enhancement in emerging market contexts.

2. MATERIALS AND METHODS

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) technique is a well-established and rigorous framework used to conduct systematic reviews and Meta-Analyses within the realm of academic research (Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., 2009; Qureshi & Khan, 2020; Rethlefsen et al., 2021). The PRISMA standards provide a systematic and organised framework for the execution and documentation of systematic reviews, therefore improving the transparency and overall quality of this kind of research (Khan & Qureshi, 2020).

2.1. Search Strategy

A comprehensive search was conducted in Scopus database using the Boolean query (("intellectual capital" OR "knowledge capital" OR "human capital" OR "structural capital" OR "relational capital" OR "intangible asset") AND ("auditing" OR "audit quality" OR "audit effectiveness" OR "audit performance" OR "audit practice*"))*. This search captured 3,312 initial documents. Scopus was selected for its extensive coverage of peer-reviewed business and accounting literature from international sources, including Chinese institutions.

2.2. Screening Process

Systematic screening applied inclusion criteria at multiple stages (1) Subject area filtering retained Business, Management, Accounting, Economics, and Social Sciences disciplines (n=3,082); (2) Temporal filtering focused on 2014-2023 publications for currency and relevance (n=2,698); (3) Document type filtering retained peer-reviewed articles, reviews, and book chapters (n=2,429); (4) Geographic filtering identified Chinese context studies (n=140); (5) Language filtering retained English publications only (n=120).

Full-text screening excluded 79 studies lacking sufficient focus on intellectual capital (n=32), audit quality (n=28), empirical/theoretical rigor (n=12), or Chinese contextual relevance (n=7), yielding 41 final studies. Two independent reviewers achieved high inter-rater reliability ($\kappa = 0.82-0.91$) with disagreements resolved through discussion.

2.3. Language Selection and Bias Considerations

The English-language restriction was implemented for methodological accessibility and analytical capability reasons. However, this introduces potential selection bias by excluding Chinese-language publications that may contain unique theoretical frameworks, culturally specific insights, and indigenous conceptualizations of intellectual capital relevant to Chinese audit practices. This limitation may miss important local scholarly contributions and institutional knowledge not translated for international audiences.

Bias mitigation strategies included prioritizing Chinese-authored English publications, examining reference lists for additional relevant studies, and consulting Chinese accounting research experts. Future research should consider bilingual systematic reviews to capture comprehensive theoretical and empirical contributions from Chinese-language scholarship.

2.4. Data Extraction and Quality Assessment

Data extraction followed a standardized framework capturing bibliographic information, study characteristics, theoretical frameworks, intellectual capital dimensions (human, structural,

relational), audit quality measures, key findings, and Chinese contextual factors. Coding employed both deductive approaches based on established intellectual capital theory and inductive approaches to identify emerging themes specific to Chinese contexts.

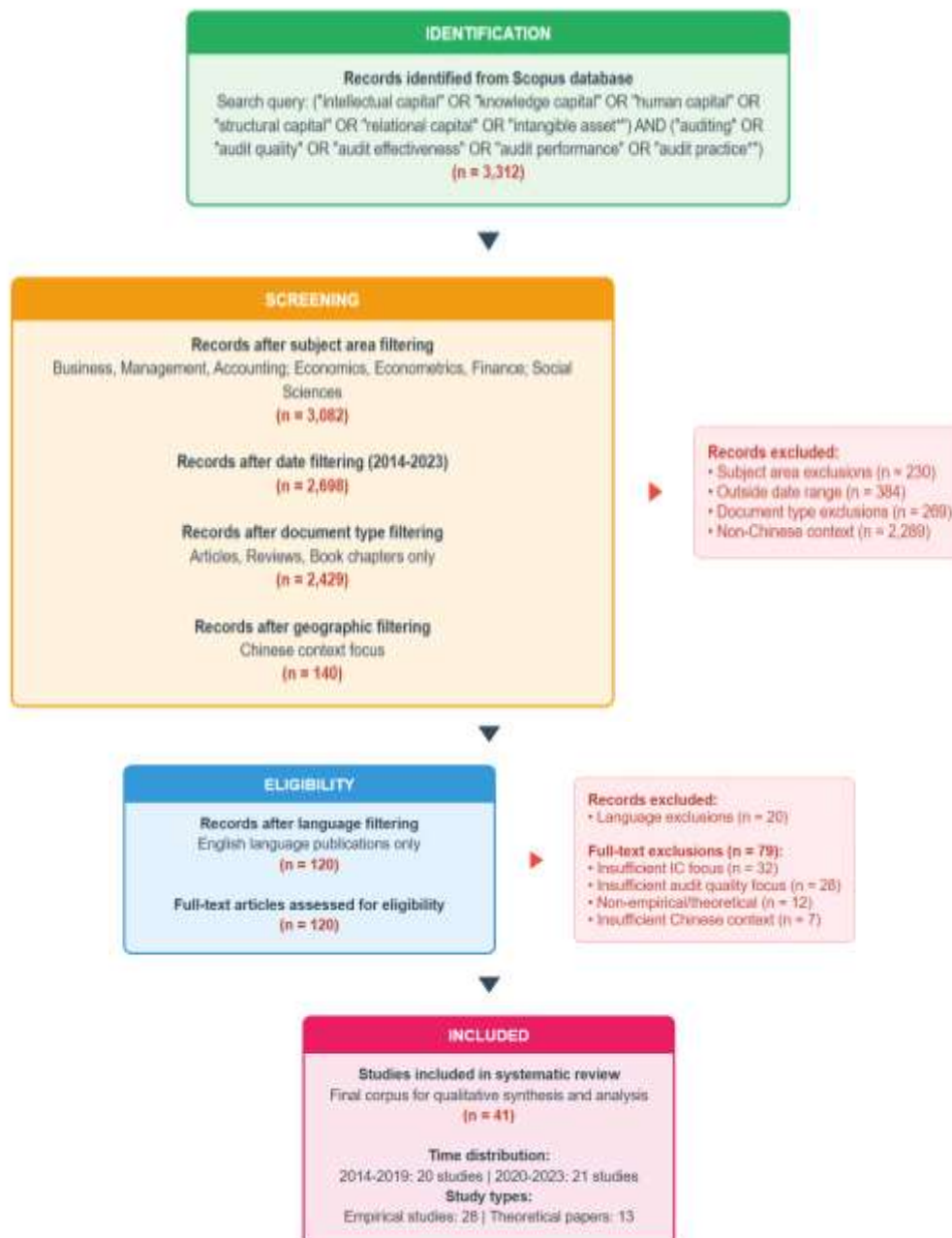


Figure 1: PRISMA Inclusion and Exclusion of Articles.

3. RESULTS

3.1. Descriptive

The data analysis in this study was conducted utilising R Studio, a software platform renowned for its proficiency in statistical computing and

visualisation. The selection of R Studio as the preferred software platform was predicated upon its compatibility with a diverse range of operating systems, encompassing Windows, Mac, and Linux. In contrast to alternative statistical software solutions that rely on intuitive graphical interfaces for

executing operations, the R programming language necessitates the utilisation of command-based input to execute operations. The RStudio software, known for its intuitive command editing interface, was employed to facilitate access to the R programming language (Stander & Dalla Valle, 2017). In addition, it is worth noting that RStudio possesses the capability to utilise markdown, a valuable tool that facilitates the generation of reproducible reports or slide-based presentations, thereby accommodating a wide range of output formats. Furthermore, the dataset encompasses the temporal range from 2014 to 2023, thereby providing a comprehensive overview of the progress made within the respective domain over ten years. The dataset utilised in this study consisted of a comprehensive collection of 120 documents procured from diverse scholarly sources, including reputable journals and books.

The dataset provided in the Table 1 format encompasses a time frame of ten years, specifically from 2014 to 2023. It comprises a comprehensive collection of 120 scholarly documents procured from diverse academic sources, including esteemed journals and reputable books. The dataset under examination displays a noteworthy annual growth rate of 55.77%, which serves as a clear indication of the escalating scholarly attention towards the convergence of intellectual capital, audit quality, and accounting firms. The mean age of the documents exhibits a relatively low value of 1.32 years, thereby indicating the presence of a timely and up-to-date collection of literature. The aforementioned documents demonstrate a noteworthy mean of 9.117 citations per document, thereby emphasising their scholarly significance and impact. Moreover, the comprehensive scope of this dataset is apparent in the considerable quantity of citations, totalling 10,034. The contents of the document exhibit a wide range of intellectual contributions, as evidenced by the presence of 231 Keywords Plus (ID) and 418 Author's Keywords (DE), which offer valuable insights into the diverse themes explored. About the authors involved in this study, a comprehensive tally reveals a total of 325 individuals who have made contributions to this corpus of literature. Among these contributions, it is noteworthy that 8 documents have been authored solely by a single individual, without any collaborative efforts. The prevalence of collaboration among authors is observed, with an average of 3.35 co-authors per document being reported. Furthermore, it is noteworthy that approximately 17.5% of these collaborative efforts transcend national boundaries, indicating an international dimension to these

collaborations. The corpus primarily consists of 115 scholarly articles and 5 review papers, indicating the extensive scope of the dataset in terms of academic contributions.

Table 1: Main Information.

| Description | Results |
|---------------------------------|-----------|
| Timespan | 2014:2023 |
| Sources (Journals, Books, etc) | 65 |
| Documents | 120 |
| Annual Growth Rate % | 55.77 |
| Document Average Age | 1.32 |
| Average citations per doc | 9.117 |
| References | 10034 |
| Keywords Plus (ID) | 231 |
| Author's Keywords (DE) | 418 |
| Authors | 325 |
| Authors of single-authored docs | 8 |
| Single-authored docs | 8 |
| Co-Authors per Doc | 3.35 |
| International co-authorships % | 17.5 |
| Article | 115 |
| Review | 5 |

In addition, Figure 2, an illustrative representation showcasing the yearly generation of scholarly articles, offers significant elucidation regarding the progressive scholarly curiosity and productivity about the domain of intellectual capital, audit quality, and accounting firms throughout the temporal continuum.

The presented figure illustrates a rather conservative initiation in the year 2014, wherein a solitary article about the subject matter was observed. In subsequent years, specifically 2015 and 2016, a marginal increment was observed, with the publication of two and one article, respectively. Starting in the year 2017, a discernible upward trend can be observed in the production of scholarly articles.

In the year 2018, there was a notable increase in the number of articles, specifically doubling to a count of three. This observation suggests a discernible surge in the level of interest surrounding the subject matter. The observed trend persisted, with a subsequent rise in the quantity of articles to a total of seven in the year 2019. The current year has witnessed a significant inflexion point, characterised by a notable increase in academic contributions. The years 2020 and 2021 exhibited a notable surge in growth, characterised by the publication of six and fifteen articles, respectively. The observed substantial rise in numbers suggests a notable surge in scholarly attention towards the subject matter. Significantly, the calendar year 2022 exhibits a noteworthy advancement, as evidenced by the publication of a total of 30 articles, indicating a

substantial upsurge in research endeavours.

The empirical data reveals a conspicuous phenomenon characterised by a notable surge in the year 2023, wherein a total of 54 scholarly articles were generated. The observed significant augmentation serves to underscore a remarkable surge in the number of scholarly endeavours about the domain of intellectual capital, audit quality, and accounting

firms. The evidence indicates that this topic has garnered significant attention and is presently a central area of scholarly inquiry. In brief, Figure 2 depicts a noteworthy escalation in the yearly output of scholarly articles spanning the period from 2014 to 2023, thereby signifying the development and dynamic nature of the research domain.

Figure 2: Growth of Scholarly Articles on Intellectual Capital, Audit Quality, and Accounting Firms (2014-2023)

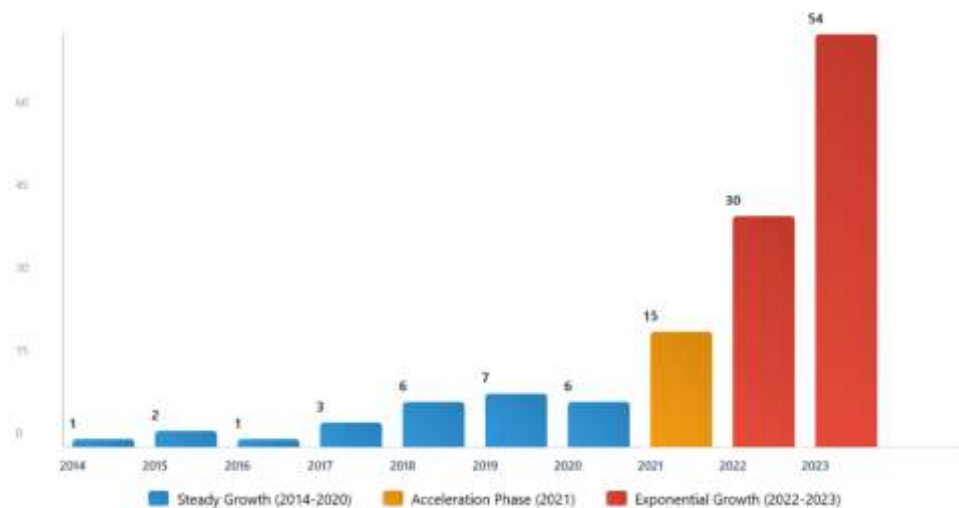


Figure 2: Annual Production (Self-Created).

Furthermore, Figure 3 presents a comprehensive compilation of the primary literature sources that have contributed significantly to the body of knowledge concerning intellectual capital, audit quality, and accounting firms. This analysis provides valuable insights into the influential journals and publications that have made significant contributions

to the ongoing discourse within this particular field of study. Within the corpus of sources analysed, it is noteworthy that the journal "Sustainability" originating from Switzerland has emerged as a prominent and influential contributor, boasting a total of 14 articles.



Figure 3: Key Sources for Scholarly Contributions (created by authors using R Studio).

This observation underscores a significant focus and dedication towards the subject matter of sustainability within the journal. The publication titled "Economic Research-EkonomskA Istrazivanja" consists of a total of 9 articles, thereby highlighting its substantial relevance as a reputable platform for the dissemination of scholarly insights within the field of economics. Furthermore, it is worth noting that the journals "Corporate Social Responsibility and Environmental Management," "Environment, Development and Sustainability," and "Technology Analysis and Strategic Management" have emerged as significant sources in the field. Each of these journals has contributed four articles of relevance to the subject matter at hand. The aforementioned sources have undeniably assumed a pivotal role in the widespread dissemination of scholarly investigations about the domains of intellectual capital, audit quality, and accounting firms. In the broader context, Figure 3 serves as a valuable tool for discerning primary scholarly works that are pivotal for procuring pertinent literature within this specific domain of study.

Additionally, the provided information in Table 2 encompasses crucial yearly citation metrics, thereby providing a comprehensive comprehension of the scholarly influence and acknowledgement of articles within the realm of intellectual capital, audit quality, and accounting firms. The presented tabular representation showcases annual data spanning from the year 2014 to 2023, thereby elucidating a multitude of noteworthy patterns and tendencies. In the year 2014, the average number of citations per article was found to be 14, indicating the frequency with which articles were referenced by other scholarly works. Furthermore, it was observed that each article, on average, received 1.00 citations per year, suggesting the rate at which citations accumulated over time for individual articles. The findings of this study reveal that the average number of citations per year per article was observed to exhibit a steady upward trend, with a mean value of 1.40. Additionally, it was observed that the articles included in the study had an average citation history spanning 1.40 years. The average value of citable years observed in this study was found to be 10, indicating the sustained duration of the citations acquired within the specified timeframe.

The subsequent years exhibited heterogeneous citation patterns. Significantly, the year 2015 observed a noteworthy surge, characterised by a mean of 103.5 citations per article and an average of 2.00 citations per year. This observation indicates a notable increase in academic acknowledgement.

However, it is worth noting that there has been a slight decrease in the average number of citations per year per article, which now stands at 11.50. Additionally, the average article has a lifespan of 9 years during which it remains citable. The subsequent years exhibit oscillating yet predominantly ascending patterns in the average number of citations per article and annum. The years 2022 and 2023 exhibit a conspicuous decline, suggesting the possibility of shifts in scholarly focus. In the year 2022, our research findings indicate that the average number of citations per article was observed to be 5.4. Furthermore, our analysis reveals a noteworthy annual citation rate of 30.00 citations. However, the articles exhibited an average citation rate of 2.70 per annum, accompanied by a mean duration of 2 years during which they were deemed citable. In the year 2023, it was observed that the average number of citations per article reached a value of 1.85, indicating a noteworthy annual citation rate of 54.00. The calculated average number of citations per year per article was found to be 1.85, suggesting a notable emphasis on recent citations.

Table 2: Annual Citation Metrics.

| Year | Mean TC per Art | N | Mean TC per Year | Citable Years |
|------|-----------------|-------|------------------|---------------|
| 2014 | 14 | 1.00 | 1.40 | 10 |
| 2015 | 103.5 | 2.00 | 11.50 | 9 |
| 2016 | 23 | 1.00 | 2.88 | 8 |
| 2017 | 26 | 1.00 | 3.71 | 7 |
| 2018 | 15.33 | 3.00 | 2.56 | 6 |
| 2019 | 30.14 | 7.00 | 6.03 | 5 |
| 2020 | 18.17 | 6.00 | 4.54 | 4 |
| 2021 | 13.07 | 15.00 | 4.36 | 3 |
| 2022 | 5.4 | 30.00 | 2.70 | 2 |
| 2023 | 1.85 | 54.00 | 1.85 | 1 |

Likewise, in this study, we employed Bradford's Law, a bibliometric theory renowned for its ability to delineate the distribution patterns of scientific literature within various subject domains. The invention in question was attributed to Samuel C. Bradford, who is credited with its development in the year 1981. According to the seminal work by (O'Connor et al., 2001), it has been established that Bradford's Law governs the distribution of scholarly articles or publications within a hierarchical network of journals or sources. This law posits that the quantity of such articles about a specific topic exhibits an uneven distribution pattern. As per the scholarly work conducted by Nordstrom in 1990, a compilation of various articles was utilised as the primary dataset to establish the hierarchical order of academic journals. The journal exhibiting the highest level of productivity is attributed with a rating of 1, while the subsequent journal demonstrating the

second highest level of productivity is allocated a rank of 2, and so forth. The assignment of a rating to each title is conducted in a manner that remains unaffected by the quantity of articles generated by said title. In instances where multiple journals exhibit an equal number of articles, the assignment of ranks is conducted in a stochastic manner.

The formula utilised in the present study was as follows

$$R(n) = k \log(n)$$

The variable $R(n)$ is utilised to represent the aggregate quantity of scholarly articles that have been contributed by the foremost n journals. The variable $R(l)$ denotes the numerical quantity of scholarly articles that have been contributed by the journal with the highest rank. The computation of $R(2)$ involves the summation of the number of articles published in the highest-ranked journal with the number of articles published in the second-ranked journal. The variable k , denoted as a constant, is employed in the research methodology, with its value being subject to variation for each search conducted. The matter pertains to the corpus of documents currently under scrutiny and potentially holds significance in the process of determining their ranking.

Here, Table 3 presents a noteworthy illustration of Bradford's Law, a well-regarded bibliometric theory

recognised for its capacity to elucidate the distribution patterns of scholarly literature across different subject domains. Within the present context, the objective is to provide a comprehensive understanding of the dissemination patterns exhibited by scholarly journals about the subject domain encompassing intellectual capital, audit quality, and accounting firms.

The tabular representation classifies scholarly publications into distinct zones according to their frequency and pertinence within the specified field. In Zone 1, we observe a cluster of highly influential journals, characterised by a notable concentration of scholarly output. The prevailing landscape is predominantly shaped by the top five journals, among which "Sustainability (Switzerland)" emerges as the frontrunner, exhibiting a remarkable frequency of 14 articles. The present zone encompasses the fundamental and profoundly impactful journals within the respective field. Zone 2 expands the scope of distribution by encompassing journals that exhibit a level of relevance that can be classified as moderate. The journals, namely "Journal of Business Ethics" and "Transformations in Business and Economics," exhibit a comparatively lower frequency of publication. However, it is noteworthy that despite their lower frequency, these journals make substantial contributions to the existing body of literature in the field.

Table 3: Bradford's Law Application in Subject Distribution of Scholarly Journals.

| Sources | Rank | Freq | Cum Freq | Zone |
|--|------|------|----------|--------|
| Sustainability (Switzerland) | 1 | 14 | 14 | Zone 1 |
| Economic Research-Ekonomiska Istrazivanja | 2 | 9 | 23 | Zone 1 |
| Corporate Social Responsibility and Environmental Management | 3 | 4 | 27 | Zone 1 |
| Environment, Development and Sustainability | 4 | 4 | 31 | Zone 1 |
| Technology Analysis and Strategic Management | 5 | 4 | 35 | Zone 1 |
| International Review of Financial Analysis | 6 | 3 | 38 | Zone 1 |
| Journal of Business Ethics | 7 | 3 | 41 | Zone 1 |
| Transformations In Business and Economics | 8 | 3 | 44 | Zone 2 |
| Applied Economics | 9 | 2 | 46 | Zone 2 |
| Asian Review of Accounting | 10 | 2 | 48 | Zone 2 |
| Borsa Istanbul Review | 11 | 2 | 50 | Zone 2 |
| Business Strategy and The Environment | 12 | 2 | 52 | Zone 2 |
| China Finance Review International | 13 | 2 | 54 | Zone 2 |
| China Journal of Accounting Research | 14 | 2 | 56 | Zone 2 |
| China Journal of Accounting Studies | 15 | 2 | 58 | Zone 2 |
| Economic Modelling | 16 | 2 | 60 | Zone 2 |
| Emerging Markets Finance and Trade | 17 | 2 | 62 | Zone 2 |
| European Journal of Innovation Management | 18 | 2 | 64 | Zone 2 |
| Frontiers of Business Research in China | 19 | 2 | 66 | Zone 2 |
| Journal of Cleaner Production | 20 | 2 | 68 | Zone 2 |
| Journal of Risk Analysis and Crisis Response | 21 | 2 | 70 | Zone 2 |
| Managerial and Decision Economics | 22 | 2 | 72 | Zone 2 |
| North American Journal of Economics and Finance | 23 | 2 | 74 | Zone 2 |
| PLOS One | 24 | 2 | 76 | Zone 2 |
| Quality and Quantity | 25 | 2 | 78 | Zone 2 |

The ongoing expansion of the table is anticipated, with the possibility of incorporating additional zones as the number of journals and their pertinence diminishes. The data provided predominantly centres around Zone 1 and Zone 2. The utilisation of Bradford's Law enables researchers to obtain a systematic perspective on the dissemination of scholarly journals, thereby facilitating a more comprehensive comprehension of the principal publications and their relative importance within the realm of intellectual capital, audit quality, and accounting firms. The utilisation of this tool facilitates the identification of pivotal sources for scholarly investigations, thereby enhancing the efficiency of navigating academic literature within the respective field.

However, Table 4 highlights the most highly cited articles in the field of intellectual capital, audit quality, and accounting firms, providing crucial insights into the scholarly impact of individual research papers. The table features a selection of articles along with their respective DOIs, total citation counts, citations per year (TC per Year), and

normalized TC scores. Topping the list is "DU X, 2015, J BUS ETHICS" with a remarkable 181 total citations, indicating its substantial influence within the research community. This article maintains an impressive TC per Year rate of 20.11 and a normalized TC score of 1.75, underscoring its enduring impact. Following closely is "LI Y, 2019, SUSTAINABILITY" with 78 total citations, demonstrating a high TC per Year rate of 15.60 and a substantial normalized TC score of 2.59.

The third-ranked article, "HE K, 2021, TECHNOL FORECAST SOC CHANGE," boasts 65 total citations, a robust TC per Year rate of 21.67, and a normalized TC score of 4.97, indicating its rapid recognition and scholarly importance. Table 4 encompasses a range of articles, each with varying degrees of impact and citation counts, providing a comprehensive view of the most influential contributions to the field of intellectual capital, audit quality, and accounting firms. These articles serve as foundational resources for researchers, offering valuable insights into the subject matter and shaping the ongoing discourse in this domain.

Table 4: Top-Cited Articles in the Field of Intellectual Capital, Audit Quality, and Accounting Firms.

| Paper | DOI | Total Citations | TC per Year | Normalized TC |
|------------------------|--------------------------------|-----------------|-------------|---------------|
| (Du, 2015) | 10.1007/s10551-014-2122-y | 181 | 20.11 | 1.75 |
| (Y. Li et al., 2019a) | 10.3390/su11092713 | 78 | 15.60 | 2.59 |
| (K. He et al., 2021) | 10.1016/j.techfore.2021.120664 | 65 | 21.67 | 4.97 |
| (Ain et al., 2020) | 10.1108/IJOEM-10-2019-0818 | 44 | 11.00 | 2.42 |
| (Zaid et al., 2019a) | 10.1108/JGR-10-2018-0053 | 42 | 8.40 | 1.39 |
| (Zaid et al., 2019b) | 10.1080/09638180.2016.1264306 | 38 | 6.33 | 2.48 |
| (L. Chen et al., 2019) | 10.1111/eufm.12173 | 36 | 7.20 | 1.19 |
| (Zhai et al., 2022) | 10.1002/csr.2288 | 34 | 17.00 | 6.30 |
| (Z. Ma et al., 2019) | 10.1111/jbfa.12398 | 33 | 6.60 | 1.09 |
| (Wang et al., 2020) | 10.1016/j.econmod.2019.11.011 | 30 | 7.50 | 1.65 |
| (Xu et al., 2021) | 10.1007/s10668-021-01319-x | 27 | 9.00 | 2.07 |
| (D. Li et al., 2017) | 10.1007/s11135-016-0352-z | 26 | 3.71 | 1.00 |
| (An et al., 2015a) | 10.1016/j.adiac.2015.09.001 | 26 | 2.89 | 0.25 |
| (Cao et al., 2016) | 10.1007/s10551-014-2383-5 | 23 | 2.88 | 1.00 |
| (Zheng et al., 2022) | 10.3390/su14148677 | 22 | 11.00 | 4.07 |
| (Issa et al., 2021) | 10.1108/CG-06-2020-0222 | 21 | 7.00 | 1.61 |
| (Lu et al., 2021a) | 10.1177/2158244021996702 | 19 | 6.33 | 1.45 |
| (Gao et al., 2020) | 10.1111/fima.12301 | 17 | 4.25 | 0.94 |
| (Lin et al., 2022a) | 10.3390/su14116882 | 16 | 8.00 | 2.96 |
| (Lin et al., 2022b) | 10.1108/MEDAR-01-2021-1155 | 14 | 7.00 | 2.59 |
| (Qiu et al., 2023) | 10.1016/j.techfore.2023.122684 | 14 | 14.00 | 7.56 |
| (Shi et al., 2020) | 10.1080/1540496X.2019.1700363 | 14 | 3.50 | 0.77 |
| (Aerts & Zhang, 2014) | 10.1016/j.emj.2013.12.006 | 14 | 1.40 | 1.00 |
| (H. Chen & Zhao, 2022) | 10.1016/j.jclepro.2022.132617 | 11 | 5.50 | 2.04 |
| (Omran et al., 2021) | 10.1108/JAAR-04-2020-0077 | 11 | 3.67 | 0.84 |

3.2. Trends and Clusters

Moreover, the study also analysed the trending topics in recent years to understand the importance of the topic. Table 5 presents a comprehensive analysis of the prevailing themes in the domain of

intellectual capital, audit quality, and accounting firms. This data elucidates the specific subjects that have garnered significant attention in recent times, thereby offering valuable insights into the current trends within these areas of study. Table 5

representation showcases the various subjects under investigation, along with their corresponding frequency (freq) and the chronological years in which they garnered significant scholarly interest. **Specifically, the years of interest are categorised into three distinct quartiles** the first quarter (year_q1), the median (year_med), and the third quarter (year_q3). The subject of "China" has emerged as a prominent area of academic investigation, exhibiting a notable occurrence rate of 27, predominantly observed during the temporal span encompassing the years 2022 and 2023. The aforementioned observation indicates that the examination and investigation of China's involvement in the realm of intellectual capital, audit quality, and accounting firms has emerged as a central topic of discourse and scholarly inquiry.

The topics of "sustainable development" and "innovation" have emerged as prominent areas of investigation, as evidenced by their notable frequencies in recent scholarly discourse. This observation underscores the significance attributed to these subjects within the realm of contemporary

research. The observed phenomena have displayed discernible patterns commencing as early as the year 2021 and persisting through the years 2022 and 2023, thereby indicating their enduring significance within the domain. The concepts of "firm size" and "decision making" have garnered increasing attention, particularly in the years 2022 and 2023. This suggests a rising focus on the intricate interplay between these variables and intellectual capital, audit quality, and accounting practices.

Furthermore, it is worth noting that the concepts of "performance assessment" and "sustainability" have exhibited a conspicuous prevalence throughout the year 2021, and their pertinence is expected to persist as we venture into the years 2022 and 2023. This observation indicates a persistent fascination with assessing performance and sustainability within the specific research domain under consideration. The subject matter of "investment" has emerged as a prominent and noteworthy topic in the year 2021, and its significance has endured and persisted throughout the subsequent year of 2023.

Table 5: Trending Topics.

| Item | freq | year_q1 | year_med | year_q3 |
|-------------------------|------|---------|----------|---------|
| performance assessment | 5 | 2021 | 2021 | 2022 |
| Sustainability | 5 | 2021 | 2021 | 2023 |
| China | 27 | 2022 | 2022 | 2023 |
| sustainable development | 13 | 2021 | 2022 | 2023 |
| Innovation | 12 | 2021 | 2022 | 2023 |
| firm size | 7 | 2022 | 2023 | 2023 |
| decision making | 6 | 2022 | 2023 | 2023 |
| Investment | 5 | 2021 | 2023 | 2023 |

Furthermore, the topic of research was chosen as the keyword plus during the building of the thematic map and examination of its progression (Cobo *et al.*, 2011). To achieve the best results, the word count was limited to 50 to 300, allowing for thorough research (X. Chen *et al.*, 2019; Sengupta & Vaish, 2023). The visualization described in Figure 4 provides a comprehensive thematic map, which serves as a tool for identifying and understanding the key themes within the field of intellectual capital, audit quality, and accounting firms. This map is generated by considering the frequency of themes about a thousand documents and their density and centrality.

The map is divided into four distinct quadrants, each of which signifies a particular theme category. The horizontal and vertical dotted lines act as dividers, helping to demarcate these quadrants.

- **Emerging Themes:** These are themes that are gaining prominence within the field. They are

the subjects of increasing interest and research focus.

- **Diminishing Themes:** Conversely, diminishing themes are those that are gradually losing significance in the research landscape.
- **Basic Themes:** Basic themes are the core and established subjects that form the foundation of research in this area. They are central and enduring.
- **Niche Topics:** Niche topics represent specialized areas of research that are of limited scope but still hold importance.

The thematic map, in this context, identifies "corporates" and "economics" as basic themes, indicating their fundamental role in the field. Additionally, it highlights "sustainability" and "economic growth" as niche topics, signifying their specialized significance. Notably, the map underscores the intersection of "economic and social

effects of finance," "China," and "sustainable development" within the niche motor themes. This

suggests that these are dynamic and interrelated areas of study that are currently gaining attention.

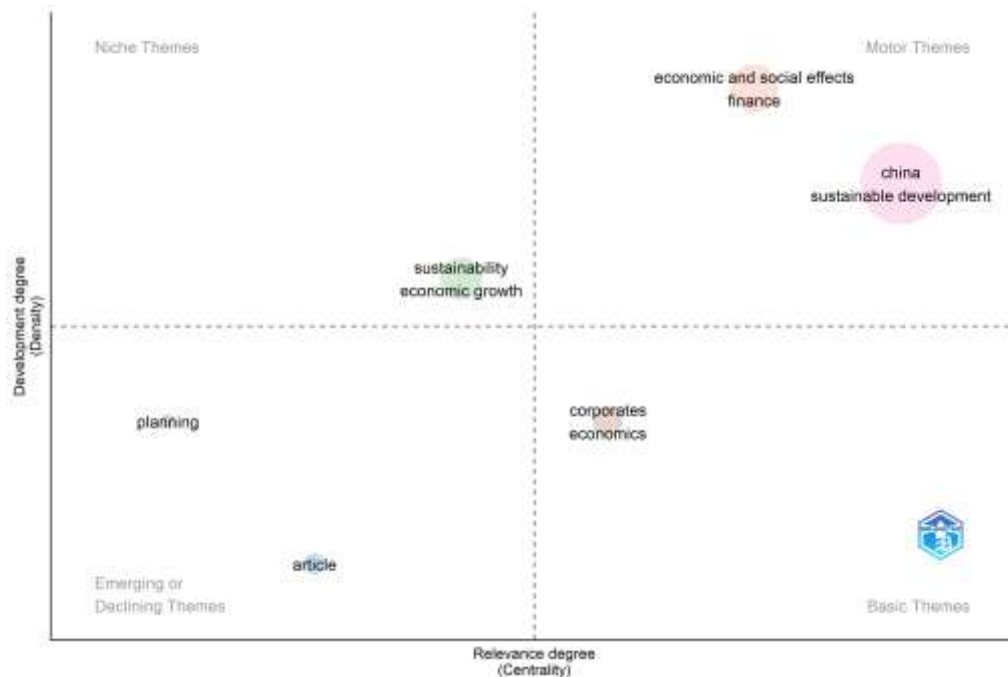


Figure 4: Thematic Map (using R Studio).

Furthermore, Table 6 showcases the prominent groupings observed within the domains of intellectual capital, audit quality, and accounting firms. The assessment of these clusters is conducted utilising the metrics of Callon Centrality, Callon Density, Rank Centrality, Rank Density, and Cluster Frequency. The presented table provides valuable insight into the significance and prevalence of each cluster within the scholarly domain.

The cluster labelled as "sustainability" exhibits the most prominent Callon Density, thereby emphasising its pivotal and interrelated position within the domain. The observed metric values indicate that it holds the third position in terms of both Callon Centrality and Cluster Frequency. The observed evidence suggests that sustainability manifests as a fundamental and pervasive motif, intricately interwoven with various other subjects of significance. Also, the cluster denoted as "planning," which exhibits the highest ranking in terms of Callon

Centrality, demonstrates a dearth of substantial presence when considering both density and frequency. This observation implies that the cluster may not hold as much centrality in the ongoing discourse as compared to other thematic clusters. The entities commonly referred to as "corporates" demonstrate a notable level of Callon Centrality and Cluster Frequency, indicating their significance and interconnectedness within the domain under study. The observed metric exhibits a notable placement at the fourth position in terms of both Callon Centrality and Rank Density. Furthermore, China has emerged as a prominent cluster within the network, occupying the sixth position in terms of Callon Centrality. Notably, China exhibits the highest Callon Density, indicating a substantial level of interconnectedness with various other topics present in the network. The Cluster Frequency of 124 is a noteworthy metric that highlights the substantial contribution of China to the ongoing discussions and research in this domain.

Table 6: Major Clusters Identification.

| Cluster | Callon Centrality | Callon Density | Rank Centrality | Rank Density | Cluster Frequency |
|-----------------------------|-------------------|----------------|-----------------|--------------|-------------------|
| sustainability | 0.4 | 71.25 | 3 | 4 | 11 |
| planning | 0 | 50 | 1 | 2.5 | 2 |
| corporates | 0.583333333 | 50 | 4 | 2.5 | 5 |
| China | 2.713666667 | 75.5305839 | 6 | 5 | 124 |
| economic and social effects | 1.333333333 | 77.7777778 | 5 | 6 | 15 |

The empirical findings reveal that the phenomenon under investigation, namely the "economic and social effects," exhibit a notable degree of prominence characterised by a substantial Callon Density and a Cluster Frequency of 15. These metrics suggest that this cluster holds a pivotal and interconnected position within the broader network. According to our analysis, the entity in question exhibits a notable position in the network structure, as it attains the fifth rank in terms of Callon Centrality and the sixth rank in terms of Rank Density.

Furthermore, the analysis presented in Table 7 pertains to the sustainability cluster within the domain of intellectual capital, audit quality, and accounting firms. The present analysis provides a comprehensive account of the observed phenomena, linguistic expressions, cluster designation, betweenness centrality (referred to as btw centrality), closeness centrality (abbreviated as close centrality), and page rank centrality about the most salient terms encompassed by this particular cluster.

The cluster denoted as Cluster 1, commonly referred to as the "sustainability" cluster, holds paramount significance within the research domain. This assertion is substantiated by its substantial frequency of appearances and the fact that the term "sustainability" serves as its fundamental concept. The observed term exhibits an exceptionally elevated betweenness centrality value of 1245.718281, thereby indicating its pivotal function in facilitating the interconnection of diverse elements within the research network. Moreover, the observed low value of the closeness centrality metric (0.001792115) serves as an indication of its pivotal role as a bridge,

facilitating the interconnectivity among diverse components present within the cluster.

Within the broader context of the sustainability cluster, two notable terms that warrant attention are "economic growth" and "uncertainty analysis." The metric of betweenness centrality for the phenomenon of "economic growth" is observed to be 561.6760658, indicating a significant role in facilitating connections among various components within the cluster. The concept of "uncertainty analysis" exhibits a noteworthy degree of betweenness centrality (1548.39103), thereby underscoring its pivotal function in establishing connections among diverse components. Both of these terms play a pivotal role in the cluster and contribute significantly to its overall coherence.

Cluster 1, denoted as "corporates," emerges as a salient cluster within Table 7, warranting further attention and investigation. The term "corporates" exhibits a notable betweenness centrality value of 2439.881323, thereby signifying its substantial role in facilitating connections among various components within this particular cluster. The aforementioned observation implies that the concept of "corporates" holds a prominent position within the realm of the sustainability cluster.

Furthermore, it is worth noting that the field of economics is encompassed within the cluster of corporates. The observed betweenness centrality value of 378.2821162 for the given entity is of considerable significance, as it signifies its pivotal function in facilitating connections among various constituent elements within the analysed cluster.

Table 7: Sustainability Cluster Analysis.

| Occurrences | Words | btw centrality | Clos centrality | page rank centrality |
|-------------|----------------------|----------------|-----------------|----------------------|
| 5 | Sustainability | 1245.718281 | 0.001792115 | 0.011532114 |
| 2 | economic growth | 561.6760658 | 0.001730104 | 0.004302319 |
| 2 | Heterogeneity | 145.2460833 | 0.001912046 | 0.003471314 |
| 2 | uncertainty analysis | 1548.39103 | 0.001934236 | 0.005355416 |
| 3 | Corporates | 2439.881323 | 0.001858736 | 0.010341464 |
| 2 | Economics | 378.2821162 | 0.001851852 | 0.006537701 |

Furthermore, the present study presents a comprehensive analysis of the cluster of "Accounting Firms in China," as depicted in Table 8. The present cluster exhibits a conglomeration of multiple lexical units, wherein each constituent word manifests distinct frequencies of appearance and measures of centrality. The present study offers valuable insights into the contextual significance of these specific words within the realm of accounting firms operating in the Chinese market. The lexical unit

denoted as "China" exhibits the utmost salience within this cluster, displaying a remarkably elevated betweenness centrality value of 8473.435583. This numerical representation serves as a testament to its pivotal function in establishing connections among diverse constituents of scholarly investigations about accounting enterprises situated within the geographical boundaries of China. The term holds a pivotal position in the ongoing discourse within this particular cluster.

The cluster under investigation demonstrates the noteworthy involvement of "sustainable development" and "innovation", both of which exhibit considerable betweenness centrality values of 3326.013781 and 1578.206612, correspondingly. The terms serve as pivotal focal points that establish interconnections among diverse facets of scholarly investigations about accounting firms operating within the Chinese context. Furthermore, it is worth noting that the concepts of "firm size," "decision making," and "investment" display significant betweenness centralities. This observation emphasises their crucial role as intermediary terms that facilitate connections between various elements

within the given cluster.

The inclusion of terms such as "performance assessment," "corporate social responsibility," "corporate strategy," "governance approach," "empirical analysis," "green economy," "industrial enterprise," "manufacturing," "panel data," "strategic approach," "academic performance," "environmental economics," "financial system," "firm ownership," "foreign direct investment," "government," "numerical model," "questionnaire survey," "spatiotemporal analysis," "state-owned enterprise," "technological development," and "threshold" within this cluster is substantiated by their respective betweenness centralities.

Table 8: Cluster Analysis-Accounting Firms in China.

| Occurrences | Words | Btw Centrality | Clos Centrality | Page Rank Centrality |
|-------------|---------------------------------|----------------|-----------------|----------------------|
| 25 | China | 8473.435583 | 0.002487562 | 0.045797216 |
| 12 | sustainable development | 3326.013781 | 0.002197802 | 0.022883924 |
| 12 | innovation | 1578.206612 | 0.001976285 | 0.023472691 |
| 7 | firm size | 2428.848588 | 0.002028398 | 0.015652098 |
| 5 | decision making | 3641.572394 | 0.001814882 | 0.014490777 |
| 5 | investment | 372.4657526 | 0.001709402 | 0.008863547 |
| 5 | performance assessment | 344.7247814 | 0.001845018 | 0.008266297 |
| 4 | corporate social responsibility | 435.2895684 | 0.001904762 | 0.006446703 |
| 4 | corporate strategy | 187.3692434 | 0.00172117 | 0.007026454 |
| 4 | governance approach | 377.903288 | 0.001879699 | 0.00939581 |
| 3 | empirical analysis | 332.2814363 | 0.001760563 | 0.004662362 |
| 3 | green economy | 157.7980311 | 0.00177305 | 0.00593303 |
| 3 | industrial enterprise | 1159.07208 | 0.001540832 | 0.005389272 |
| 3 | manufacturing | 635.9296646 | 0.002024291 | 0.007993816 |
| 2 | panel data | 123.6596978 | 0.001858736 | 0.005999244 |
| 3 | strategic approach | 64.71474843 | 0.001751313 | 0.004703149 |
| 2 | academic performance | 69.35528363 | 0.001703578 | 0.005462856 |
| 2 | environmental economics | 136.8174033 | 0.001675042 | 0.004443053 |
| 2 | financial system | 208.2081973 | 0.001912046 | 0.004536922 |
| 2 | firm ownership | 353.5228883 | 0.001953125 | 0.003343794 |
| 2 | foreign direct investment | 65.03936624 | 0.001584786 | 0.003437068 |
| 2 | government | 13.20955985 | 0.001547988 | 0.004270639 |
| 2 | numerical model | 71.75883214 | 0.001689189 | 0.004498738 |
| 2 | questionnaire survey | 138.9082793 | 0.001607717 | 0.003516349 |
| 2 | spatiotemporal analysis | 80.98379874 | 0.001712329 | 0.004269724 |
| 2 | state-owned enterprise | 37.18401478 | 0.001552795 | 0.004187046 |
| 2 | technological development | 55.35196857 | 0.001639344 | 0.006385156 |
| 2 | threshold | 14.79762217 | 0.001512859 | 0.003365202 |

Moreover, Table 9 offers a comprehensive examination of the cluster in the domain of "Economic and Social Effects." The present cluster encompasses a diverse array of lexical units, each exhibiting distinct frequencies of occurrence and centrality measures. This conglomeration of words provides valuable insights into the inherent importance of these terms within the realm of economic and social ramifications. The cluster under consideration demonstrates a notable emphasis on the concept of "economic and social effects," as evidenced by its significant betweenness centrality

value of 1306.355116. The term assumes a pivotal function in establishing a cohesive framework that interlinks various components of investigation within the designated thematic domain.

In addition, the term "finance" holds significant importance within the cluster, as evidenced by its high betweenness centrality value of 2483.762527. This value suggests that finance plays a crucial role in facilitating connections between different dimensions of economic and social impacts. The concept of "risk management" holds a prominent position in the discourse, as evidenced by its

substantial betweenness centrality score of 1414.203747. The term assumes a pivotal function in establishing a cohesive framework that interlinks various components and dialogues about the economic and social ramifications of risk management.

Additionally, the observed betweenness centralities of "Regression analysis" and "tax reform" are of particular interest, as they demonstrate their significant role in facilitating connections among various components within this cluster. The phenomena of "risks management" and "risks management" are both significant factors that contribute to the cohesiveness of the cluster. This is

evident from their respective betweenness centralities, which indicate their crucial role in establishing connections between different topics within the cluster. In brief, Table 9 presents a comprehensive examination of the cluster labelled as "Economic and Social Effects," with a focus on the key terms and their relevance in establishing linkages among various research components within the domain of economic and social effects. The amalgamation of these terminologies collectively contributes to a comprehensive comprehension of the economic and social ramifications within the domain.

Table 9: Cluster Analysis-Economic and Social Effects.

| Occurrences | Words | btw centrality | Clos centrality | page rank centrality |
|-------------|-----------------------------|----------------|-----------------|----------------------|
| 3 | economic and social effects | 1306.355116 | 0.001996008 | 0.009550196 |
| 3 | finance | 2483.762527 | 0.002083333 | 0.009179623 |
| 3 | risk management | 1414.203747 | 0.001733102 | 0.010022036 |
| 2 | regression analysis | 872.7740817 | 0.002074689 | 0.005099912 |
| 2 | risks management | 272.3746748 | 0.001658375 | 0.006829274 |
| 2 | tax reform | 589.1883327 | 0.00177305 | 0.005649943 |

The exponential increase in China-focused intellectual capital and audit quality research during 2022-2023 can be attributed to four key catalytic factors that converged during this period. First, COVID-19's lasting impact on audit digitalization created research urgency around how accounting firms' technological capabilities and IT human capital affect audit quality, as Chinese firms permanently adopted remote auditing technologies and AI-assisted verification processes. Second, regulatory policy shifts played a decisive role - China's implementation of new audit quality control standards in 2022 and enhanced corporate governance requirements mandated investigation of how firms' intellectual capital enables regulatory compliance. Third, ESG reporting mandates introduced in 2022 created new audit complexity requiring enhanced auditor expertise, generating research interest in how human capital (ESG knowledge) and structural capital (specialized methodologies) influence audit effectiveness in sustainability contexts. Finally, international market pressures following Chinese stock volatility and US delisting concerns elevated academic attention to audit quality determinants, with intellectual capital emerging as critical for maintaining international audit standards and market confidence.

3.3. Classification: Intellectual Capital and Audit Quality

This theme explores the relationship between

intellectual capital and audit quality within accounting firms. It examines how the intellectual capital of auditors, including their knowledge, skills, and expertise, contributes to the quality of audits. In addition, Intellectual capital refers to the collective knowledge, expertise, and intangible resources that play a substantial role in enhancing a company's worth and its ability to gain a competitive edge. The significance of intellectual capital is crucial in the realm of audit quality (Peprah *et al.*, 2019). Auditors that possess a substantial amount of intellectual capital are equipped with the necessary knowledge and ability to conduct a comprehensive review and evaluation of a company's financial statements (Nicolo' *et al.*, 2020). This encompasses a comprehensive comprehension of complex accounting and financial reporting issues, the aptitude to identify prospective hazards, and the capability to provide perceptive and precise audit judgements (Ahmed Haji, 2015; Buallay, 2018a). Additionally, the presence of intellectual capital inside a corporation contributes to the development of a corporate culture that emphasises and maintains high standards of audit quality (Mala & Chand, 2015).

According to (Dalwai & Mohammadi, 2020), auditors with a higher degree of intellectual capital have a greater propensity to maintain essential professional qualities, including scepticism, objectivity, and adherence to ethical norms, in their audit pursuits. The enhanced talents of these

individuals allow them to recognise and resolve possible biases or conflicts of interest that may hinder the autonomy and impartiality of the auditing procedure (Mökander et al., 2021). Moreover, the utilisation of intellectual capital enables auditors to proficiently use technology and information systems, consequently augmenting the efficiency and efficacy of their tasks (Buallay, 2018b). By using state-of-the-art technologies and resources, auditors can enhance the efficiency of data collection and analysis, optimise audit planning and risk assessment, and improve their ability to detect any misstatements or fraudulent activities (Chan & Vasarhelyi, 2011).

Furthermore, the quality of audits performed by accounting companies is substantially impacted by their Intellectual Capital. Auditors that possess a significant amount of intellectual capital bring with them the necessary knowledge and ability to evaluate financial accounts in an efficient manner (Narwal & Yadav, 2017). They can negotiate difficult accounting challenges, identify potential hazards, and provide meaningful audit opinions (Hamdan et al., 2017). According to (Hamdam et al., 2022), intellectual Capital helps to cultivate a culture of high-quality auditing by encouraging the development of characteristics such as scepticism, objectivity, and ethical standards. This, in turn, makes it easier for auditors to overcome prejudices or conflicts of interest, which ensures that they remain independent (Moghadam et al., 2023). In addition, intellectual capital gives auditors the ability to harness technology, which results in increased productivity in data processing, audit planning, and risk assessment (Sri & Anis, 2021).

3.4. Auditor Characteristics and Audit Quality

This theme focuses on the characteristics of auditors that influence audit quality. It examines factors such as auditor expertise, experience, independence, and objectivity, and their impact on the quality of audits. The qualities of auditors have a considerable influence on the quality of audits performed by accounting companies (Chu et al., 2022). In addition, the length and range of activities completed by auditors are significantly influenced by the accumulation of work experience, therefore greatly enhancing their professional skills (Bennett & Hatfield, 2018). According to (Sayed Hussin et al., 2017), the increased involvement of auditors in a wider range of audit-related tasks leads to an enhancement of their skills and effectiveness in doing audits. Auditing proficiency is comprised of personal attributes, general knowledge, and specialised abilities, together known as professional competence

(Alsudairi et al., 2020). The enhancement of personal attributes, broad knowledge, and specific abilities plays a crucial role in improving the total professional competence and expertise of auditors, hence resulting in heightened audit quality (Church et al., 2018).

According to (Knechel et al., 2020), auditor experience, knowledge, and professional judgement play vital roles in determining the efficacy of audits. Specifically, research demonstrates that these factors are important in determining the success of audits. According to (Zgarni et al., 2016), experienced auditors are better suited to traverse complicated financial settings, detect hazards, and deliver detailed evaluations. In addition, the quality of the audit is connected to the independence of the auditors, which is an essential attribute. According to (Halim et al., 2018), auditor independence protects against the possibility of conflicts of interest and ensures that auditors can evaluate financial information in an impartial manner. Also, better-quality audit process is directly correlated to auditors who have a strong ethical attitude (Lee et al., 2016).

In addition, a favourable relationship may be shown between professional scepticism, which is a necessary auditor characteristic, and audit quality (Barac et al., 2020). Sceptical auditors are more likely to dispute management claims and critically examine evidence, which reduces the risk of overlooking substantial misstatements (Boritz et al., 2020). Sceptical auditors are also more inclined to question the reliability of the information presented to them. In terms of academic credentials, auditors who possess advanced degrees or professional certifications often demonstrate improved technical skills and a deeper grasp of accounting principles, which has a favourable influence on audit quality (Svanberg & Öhman, 2015).

3.5. Role of Intellectual Capital and Board Diversity in Audit Firm Performance

This theme investigates the role of intellectual capital in the overall performance of audit firms. It explores how the intellectual capital of audit firms, including the collective knowledge, skills, and resources of their auditors, contributes to their ability to deliver high-quality audits. However, the importance of intellectual capital and board diversity in the context of audit firm performance, spanning a wide variety of topics and circumstances. (Y. Li et al., 2019b) examines the effect that intellectual capital has on the innovation performance of Chinese construction companies, and they find a substantial positive correlation between the two variables.

Extending the discussion of intellectual capital to include sustainable growth, and (Lu et al., 2021b) investigates the distinct influences of human,

structural, and relational capital on the business strategies of ninety Chinese companies that are publicly traded.

Table 10: Intellectual Capital, Board Diversity, and Performance Dynamics in Audit Firms.

| Authors | theme | Focus | Settings | outcomes |
|----------------------|---|--|--|--|
| Y. Li et al., 2019b | Intellectual Capital and Innovation | Intellectual Capital on Innovation Performance | Chinese Construction Enterprises | Intellectual capital significantly impacts the innovation performance of construction enterprises |
| Lu et al., 2021a | Intellectual Capital (IC) on Sustainable Growth | Human Capital, Structural Capital, and Relational Capital (RC) | 90 listed firms in China | IC has varying impacts on differentiation and cost leadership strategies in both countries. |
| Rahman & Liu, 2023 | intellectual capital (IC) | Corporation performance. | companies listed on the Shanghai and Shenzhen Stock Exchange i | The research emphasizes the importance of IC in enhancing firm performance in the transportation sector in China. |
| An et al., 2015b | Intellectual Capital | Alignment with Stakeholder Expectations | Top 100 Chinese A-share listed companies | The study reveals that there is no significant information gap between the expectations of Chinese stakeholders and the actual IC disclosure practices of Chinese firms. |
| Shahzad et al., 2023 | Institutional Ownership | technology investment and innovation | conducted in China | Mutual fund investors and qualified foreign institutional investors actively promote radical innovation, reducing agency risks associated with innovation. |
| Xiao & Sun, 2022 | Innovation Performance in Enterprises | Environmental complexity in these relationships. | Context of enterprises. | Environmental complexity negatively moderates the relationship between internationalization depth and innovation performance. |
| Cheng et al., 2020 | innovation performance | formal and informal institutional factors | 64 listed agricultural enterprises in China | A more robust formal institutional system is positively associated with better innovation performance in agricultural enterprises. |
| Ashraf & Qian, 2021 | Board Internationalization | Chinese non-financial listed firms | 2008 to 2017. | Higher proportion of foreign directors on corporate boards is associated with a reduction in real earnings management. |
| Dong et al., 2022 | Board Diversity, Firm Performance, and ESG Activities | Board diversity and firm performance. | ESG activities, reflecting the growing | Positive and substantial correlation between board diversity and firm success, suggesting diverse boards benefit businesses. |
| Fei et al., 2022 | Board Diversity and Firm Size | board diversity (measured by the percentage of women directors, non-executive directors, and board member nationality) and firm size | Registered firms in China from 2005 to 2019. | Positive correlations were found between firm size (measured as the logarithm of total assets) and board diversity (percentage of women directors, percentage of non-executive directors, and board member nationality) with sustainability practices (expenditures on environmental sustainability) in the top Chinese firms. |
| Y. xi Li & He, 2023 | Board Diversity and Corporate Innovation | Cognitive characteristics (educational background, expertise, tenure, and breadth of board experience). | Chinese listed firms | Cognitive diversity, particularly in attributes related to educational background and expertise, is positively associated with corporate innovation. |
| Pi T.; Yang X. | board culture on bank innovation | cultural indicators such as masculinity, degree of indulgence, cultural diversity, power distance, and uncertainty avoidance, | China's A-share listed banks | Cultural indicators like masculinity, degree of indulgence, and cultural diversity are positively related to bank innovation. |
| Yousaf et al., 2022 | Board Capital and Green Innovation | board capital facets (human and social capital) | Chinese listed firms | Board capital, including human and social capital, has a positive influence on green innovation performance in Chinese listed firms. |

In addition, (Rahman & Liu, 2023) highlight the value of intellectual capital in improving the performance of firms that are listed on the Shanghai and Shenzhen Stock Exchange. They focus on the

importance of intellectual capital in the transportation industry. In their study of the intellectual capital alignment with stakeholder expectations in the top 100 Chinese A-share listed

businesses (An et al., 2015b) concluded that there was no major information gap.

According to, (Shahzad et al., 2023) move the emphasis from individual ownership to institutional ownership and its effect on technological investment and innovation in China. They stress the importance of mutual fund investors as well as qualified international institutional investors. Also, (Xiao & Sun, 2022) investigate the intricate nature of the linkages between innovation performance and internationalisation depth in businesses, and they find that environmental complexity acts as a moderator in a way that is unfavourable. Additionally, (Cheng et al., 2020) investigate the performance of innovation in publicly traded agricultural companies in China. They place an emphasis on the favourable connection innovation performance has with a strong formal institutional framework. The influence that CEO pay has on total compensation and find that performance-CEO compensation sensitivity has no significant effect on total compensation (Ashraf & Qian, 2021). In their study, shows that the effect of board internationalisation on real earnings management in Chinese non-financial listed enterprises. They find that there is a negative correlation between the percentage of foreign directors on the board and a greater level of earnings management.

According to (Dong et al., 2022) the connections between board diversity, company performance, and ESG activities. They find that there is a positive association between board diversity and the success of the business. In their examination of the links between board diversity, company size, and sustainability practises in leading Chinese companies, (Fei et al., 2022) find that positive correlations exist between the three variables. In addition, (Y. xi Li & He, 2023) examine the relationship between diverse board membership and corporate innovation in Chinese publicly traded companies. There is a positive correlation between cognitive diversity and board membership (Pi & Yang, 2023). Also, the impact that board culture has on bank innovation in China's A-share listed banks. They focus on the beneficial associations that exist between cultural variables such as masculinity, degree of indulgence, and cultural diversity. According to, (Yousaf et al., 2022) the effect that board capital has on green innovation in Chinese publicly traded companies. Their findings indicate that human and social capital both have a favourable influence. Overall, the table 10 offers a sophisticated knowledge of the multiple linkages between intellectual capital, board diversity, and different

characteristics of company performance across varied contexts and themes in the Chinese business environment. This understanding can be found in the table 10.

4. CONCLUSION

This systematic review provides the first comprehensive examination of intellectual capital's multidimensional relationship with audit quality in Chinese accounting practices, addressing a critical knowledge gap in professional services research. Through rigorous PRISMA methodology and bibliometric analysis of 120 peer-reviewed publications spanning 2014-2023, this investigation reveals the complex mechanisms through which knowledge-based assets influence audit effectiveness in emerging market contexts.

The systematic analysis demonstrates that intellectual capital operates as a dynamic, interconnected system rather than isolated components. Human capital emerges as the foundational driver, with auditor education, experience, and competence directly influencing professional judgment and risk assessment capabilities. Structural capital provides the institutional framework enabling audit quality delivery through organizational processes, technological infrastructure, and knowledge management systems. The convergence of these dimensions creates synergistic effects that amplify audit effectiveness beyond the sum of individual components.

Bibliometric findings reveal a dramatic research acceleration, with publications increasing exponentially from 2021 onwards, culminating in 54 studies in 2023 alone. This surge reflects four catalytic factors: COVID-19's acceleration of audit digitalization, China's implementation of enhanced audit quality standards, mandatory ESG reporting requirements, and international market pressures following financial volatility. These developments have elevated intellectual capital from a peripheral concern to a central determinant of audit quality and regulatory compliance.

The thematic analysis identifies three dominant research clusters: the direct intellectual capital-audit quality nexus, auditor characteristics as quality determinants, and the broader role of intellectual capital in firm performance. Notably, sustainability emerges as a cross-cutting theme, indicating the evolution of audit practice toward environmental, social, and governance considerations. This convergence suggests that traditional audit quality frameworks require expansion to encompass

contemporary stakeholder expectations and regulatory demands.

The findings carry significant theoretical and practical implications for professional services research and audit practice. Theoretically, this study advances understanding of intellectual capital as a multifaceted performance driver in knowledge-intensive services, challenging linear conceptualizations of audit quality determinants. The evidence supports resource-based view perspectives while highlighting the contextual specificity of intellectual capital effects in emerging economies. Practically, the results inform strategic human capital development, structural capital investment priorities, and regulatory policy design for audit quality enhancement.

5. FUTURE RESEARCH

Based on the knowledge acquired via this study, it is recommended that future studies undertake a more comprehensive examination of distinct facets of

intellectual capital and their intricate impacts on the quality of audits conducted by accounting firms in China. Examining the impact of technical improvements, namely the incorporation of artificial intelligence and data analytics, on the improvement of audit procedures may provide a prospective outlook. Furthermore, doing research on the impact of legislative changes and emerging accounting standards on the correlation between intellectual capital and audit quality will enhance our overall comprehension. Further investigation is required to examine the potential influence of external variables, such as economic circumstances and global market dynamics, on the efficacy of intellectual capital in safeguarding the quality of audits. Furthermore, the inclusion of several viewpoints from stakeholders such as regulatory agencies, investors, and accounting professionals will enhance the study agenda, allowing a comprehensive analysis of the function of intellectual capital in the dynamic context of Chinese accounting practises.

Acknowledgements: The authors would like to acknowledge the collective efforts of the research team in bringing this work to completion. Dr. Nohman Khan served as the major contributor, leading the conception of the study, research design, data analysis, and the overall drafting and revision of the manuscript. Huma Sikandar contributed to the development of the research framework, literature review, and data collection. Yamunah Vaicondam provided expertise in data interpretation and contributed to the refinement of the theoretical and practical implications. Mohammad Falahat offered critical feedback on the research design and manuscript structure, and provided overall academic guidance. Rana Asaad Mohammed Alotaiby supported the data analysis, interpretation of results, and proofreading of the final manuscript. All authors read and approved the final version of the manuscript.

REFERENCES

- Aerts, W., & Zhang, S. (2014). Management's causal reasoning on performance and earnings management. *European Management Journal*, 32(5), 770–783. <https://doi.org/10.1016/J.EMJ.2013.12.006>
- Ahmed Haji, A. (2015). The role of audit committee attributes in intellectual capital disclosures: Evidence from Malaysia. *Managerial Auditing Journal*, 30(8–9), 756–784. <https://doi.org/10.1108/MAJ-07-2015-1221/FULL/PDF>
- Ain, Q. U., Yuan, X., Javaid, H. M., Usman, M., & Haris, M. (2020). Female directors and agency costs: evidence from Chinese listed firms. *International Journal of Emerging Markets*, 16(8), 1604–1633. <https://doi.org/10.1108/IJOEM-10-2019-0818/FULL/PDF>
- Alayli, S. (2023). The impact of accounting information systems on audit quality: the case of Lebanese SMES. *Dutch Journal of Finance and Management*, 5(2), 22931. <https://doi.org/10.55267/DJFM/13675>
- Alsudairi, F., Khalid, K., & Sultan Alsudairi, F. (2020). IMPACTS OF STRESS AROUSAL AND ETHICAL ORGANIZATIONAL CULTURE ON THE RELATIONSHIP OF AUDIT QUALITY PRACTICES AND ETHICAL ORGANIZATIONAL CULTURE. *International Transaction Journal of Engineering*, 11(13). <https://doi.org/10.14456/ITJEMAST.2020.256>
- An, Y., Davey, H., Eggleton, I. R. C., & Wang, Z. (2015a). Intellectual capital disclosure and the information gap: Evidence from China. *Advances in Accounting*, 31(2), 179–187. <https://doi.org/10.1016/J.ADIAC.2015.09.001>
- An, Y., Davey, H., Eggleton, I. R. C., & Wang, Z. (2015b). Intellectual capital disclosure and the information gap: Evidence from China. *Advances in Accounting*, 31(2), 179–187. <https://doi.org/10.1016/J.ADIAC.2015.09.001>
- Ashraf, B. N., & Qian, N. (2021). The Impact of Board Internationalization on Real Earnings Management: Evidence from China. <https://doi.org/10.1177/21582440211032640>, 11(3). <https://doi.org/10.1177/21582440211032640>
- Barac, K., Plant, K., Kunz, R., & Kirstein, M. (2020). Generic skill profiles of future accountants and auditors –

- moving beyond attributes. *Higher Education, Skills and Work-Based Learning*, 11(4), 908–928. <https://doi.org/10.1108/HESWBL-08-2020-0180/FULL/PDF>
- Bennett, G. B., & Hatfield, R. C. (2018). Staff auditors' proclivity for computer-mediated communication with clients and its effect on skeptical behavior. *Accounting, Organizations and Society*, 68–69, 42–57. <https://doi.org/10.1016/J.AOS.2018.05.003>
- Betti, N., & Sarens, G. (2021). Understanding the internal audit function in a digitalised business environment. *Journal of Accounting and Organizational Change*, 17(2), 197–216. <https://doi.org/10.1108/JAOC-11-2019-0114/FULL/PDF>
- Boritz, J. E., Kochetova, N. V., Robinson, L. A., & Wong, C. (2020). Auditors' and Specialists' Views About the Use of Specialists During an Audit. *Behavioral Research in Accounting*, 32(2), 15–40. <https://doi.org/10.2308/BRIA-19-064>
- Buallay, A. (2018a). Audit committee characteristics: an empirical investigation of the contribution to intellectual capital efficiency. *Measuring Business Excellence*, 22(2), 183–200. <https://doi.org/10.1108/MBE-09-2017-0064/FULL/PDF>
- Buallay, A. (2018b). Audit committee characteristics: an empirical investigation of the contribution to intellectual capital efficiency. *Measuring Business Excellence*, 22(2), 183–200. <https://doi.org/10.1108/MBE-09-2017-0064/FULL/PDF>
- Buallay, A. (2018c). Audit committee characteristics: an empirical investigation of the contribution to intellectual capital efficiency. *Measuring Business Excellence*, 22(2), 183–200. <https://doi.org/10.1108/MBE-09-2017-0064/FULL/PDF>
- Cao, J. X., Ding, Y., & Zhang, H. (2016). Social Capital, Informal Governance, and Post-IPO Firm Performance: A Study of Chinese Entrepreneurial Firms. *Journal of Business Ethics*, 134(4), 529–551. <https://doi.org/10.1007/S10551-014-2383-5/TABLES/6>
- Chan, D. Y., & Vasarhelyi, M. A. (2011). Innovation and practice of continuous auditing. *International Journal of Accounting Information Systems*, 12(2), 152–160. <https://doi.org/10.1016/J.ACCINF.2011.01.001>
- Chen, H., & Zhao, X. (2022). Green financial risk management based on intelligence service. *Journal of Cleaner Production*, 364, 132617. <https://doi.org/10.1016/J.JCLEPRO.2022.132617>
- Chen, L., Jin, Z., Ma, Y., & Xu, H. (2019). Confucianism, openness to the West, and corporate investment efficiency. *European Financial Management*, 25(3), 554–590. <https://doi.org/10.1111/EUFM.12173>
- Chen, X., Lun, Y., Yan, J., Hao, T., & Weng, H. (2019). Discovering thematic change and evolution of utilizing social media for healthcare research. *BMC Medical Informatics and Decision Making*, 19(2), 39–53. <https://doi.org/10.1186/S12911-019-0757-4/FIGURES/10>
- Cheng, L., Nsiah, T. K., Sun, K., & Zhuang, Z. (2020). Institutional environment, technical executive power and agricultural enterprise innovation performance. *Cogent Business & Management*, 7(1). <https://doi.org/10.1080/23311975.2020.1743619>
- Chu, J., Florou, A., & Pope, P. F. (2022). Auditor University Education: Does it Matter? *European Accounting Review*, 31(4), 787–818. <https://doi.org/10.1080/09638180.2020.1866633>
- Church, B. K., Gregory Jenkins, J., & Stanley, J. D. (2018). Auditor Independence in the United States: Cornerstone of the Profession or Thorn in Our Side? *Accounting Horizons*, 32(3), 145–168. <https://doi.org/10.2308/ACCH-52122>
- Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, 5(1), 146–166. <https://doi.org/10.1016/J.JOI.2010.10.002>
- Dalwai, T., & Mohammadi, S. S. (2020). Intellectual capital and corporate governance: an evaluation of Oman's financial sector companies. *Journal of Intellectual Capital*, 21(6), 1125–1152. <https://doi.org/10.1108/JIC-09-2018-0151/FULL/PDF>
- Dashtbayaz, M. L., Hameed Mezher, A., Khalid Albadr, K. H., & Alkafaji, B. K. A. (2023). The Relationship between Intellectual Capital and Audit Fees. *Journal of Risk and Financial Management*, 16(2). <https://doi.org/10.3390/JRFM16020093>
- Dong, Y., Liang, C., & Wanyin, Z. (2022). Board diversity and firm performance: impact of ESG activities in China. <https://doi.org/10.1080/1331677X.2022.2090406>
- Du, X. (2015). How the Market Values Greenwashing? Evidence from China. *Journal of Business Ethics*, 128(3), 547–574. <https://doi.org/10.1007/S10551-014-2122-Y/TABLES/8>
- Du, X., Yin, J., & Hou, F. (2018). Auditor human capital and financial misstatement: Evidence from China. *China*

- Journal of Accounting Research, 11(4), 279–305. <https://doi.org/10.1016/J.CJAR.2018.06.001>
- Fei, W., Wei, F., Chunxia, Z., & Zhen, W. (2022). The impact of environmental, social, and governance, board diversity and firm size on the sustainable development goals of registered firm in China. <https://doi.org/10.1080/1331677X.2022.2100438>
- Gao, H., Huang, J., & Zhang, T. (2020). Can online annual general meetings increase shareholders' participation in corporate governance? *Financial Management*, 49(4), 1029–1050. <https://doi.org/10.1111/FIMA.12301>
- Grima, S., Baldacchino, P. J., Grima, S., Kizilkaya, M., Tabone, N., & Ellul, L. (2023). Designing a Characteristics Effectiveness Model for Internal Audit. *Journal of Risk and Financial Management* 2023, Vol. 16, Page 56, 16(2), 56. <https://doi.org/10.3390/JRFM16020056>
- Halim, H. A., Jaafar, H., & Janudin, S. E. (2018). Factors Influencing Professional Judgment of Auditors in Malaysia. *International Business Research*, 11(11), 119. <https://doi.org/10.5539/IBR.V11N11P119>
- Hamdam, A., Jusoh, R., Yahya, Y., Abdul Jalil, A., & Zainal Abidin, N. H. (2022). Auditor judgment and decision-making in big data environment: a proposed research framework. *Accounting Research Journal*, 35(1), 55–70. <https://doi.org/10.1108/ARJ-04-2020-0078/FULL/XML>
- Hamdan, A. M., Buallay, A. M., & Alareeni, B. A. (2017). The moderating role of corporate governance on the relationship between intellectual capital efficiency and firm's performance: Evidence from Saudi Arabia. *International Journal of Learning and Intellectual Capital*, 14(4), 295–318. <https://doi.org/10.1504/IJLIC.2017.087377>
- He, K., Chen, W., & Zhang, L. (2021). Senior management's academic experience and corporate green innovation. *Technological Forecasting and Social Change*, 166, 120664. <https://doi.org/10.1016/J.TECHFORE.2021.120664>
- Issa, A., Yousef, H., Bakry, A., Hanaysha, J. R., & Sahyouni, A. (2021). Does the board diversity impact bank performance in the MENA countries? A multilevel study. *Corporate Governance (Bingley)*, 21(5), 865–891. <https://doi.org/10.1108/CG-06-2020-0222>
- Khan, N., & Qureshi, M. I. (2020). A systematic literature review on online medical services in Malaysia. *International Journal of Online and Biomedical Engineering*, 16(6), 107–118. <https://doi.org/10.3991/ijoe.v16i06.13573>
- Knechel, W. R., Thomas, E., & Driskill, M. (2020). Understanding financial auditing from a service perspective. *Accounting, Organizations and Society*, 81, 101080. <https://doi.org/10.1016/J.AOS.2019.101080>
- Krieger, F., Drews, P., & Velte, P. (2021). Explaining the (non-) adoption of advanced data analytics in auditing: A process theory. *International Journal of Accounting Information Systems*, 41, 100511. <https://doi.org/10.1016/J.ACCINF.2021.100511>
- Lee, S. C., Su, J. M., Tsai, S. B., Lu, T. L., & Dong, W. (2016). A comprehensive survey of government auditors' self-efficacy and professional development for improving audit quality. *SpringerPlus*, 5(1), 1–25. <https://doi.org/10.1186/S40064-016-2903-0/TABLES/7>
- Li, D., Xin, L., Chen, X., & Ren, S. (2017). Corporate social responsibility, media attention and firm value: empirical research on Chinese manufacturing firms. *Quality and Quantity*, 51(4), 1563–1577. <https://doi.org/10.1007/S11135-016-0352-Z/TABLES/5>
- Li, Y., Song, Y., Wang, J., & Li, C. (2019a). Intellectual Capital, Knowledge Sharing, and Innovation Performance: Evidence from the Chinese Construction Industry. *Sustainability* 2019, Vol. 11, Page 2713, 11(9), 2713. <https://doi.org/10.3390/SU11092713>
- Li, Y., Song, Y., Wang, J., & Li, C. (2019b). Intellectual Capital, Knowledge Sharing, and Innovation Performance: Evidence from the Chinese Construction Industry. *Sustainability* 2019, Vol. 11, Page 2713, 11(9), 2713. <https://doi.org/10.3390/SU11092713>
- Li, Y. xi, & He, C. (2023). Board diversity and corporate innovation: Evidence from Chinese listed firms. *International Journal of Finance & Economics*, 28(1), 1092–1115. <https://doi.org/10.1002/IJFE.2465>
- Lin, T., Wang, L., & Wu, J. (2022a). Environmental Regulations, Green Technology Innovation, and High-Quality Economic Development in China: Application of Mediation and Threshold Effects. *Sustainability* 2022, Vol. 14, Page 6882, 14(11), 6882. <https://doi.org/10.3390/SU14116882>
- Lin, T., Wang, L., & Wu, J. (2022b). Environmental Regulations, Green Technology Innovation, and High-Quality Economic Development in China: Application of Mediation and Threshold Effects. *Sustainability* 2022, Vol. 14, Page 6882, 14(11), 6882. <https://doi.org/10.3390/SU14116882>
- Lotfi, A., Salehi, M., & Lari Dashtbayaz, M. (2022). The effect of intellectual capital on fraud in financial

- statements. *TQM Journal*, 34(4), 651–674. <https://doi.org/10.1108/TQM-11-2020-0257/FULL/PDF>
- Lu, Y., Li, G., Luo, Z., Anwar, M., & Zhang, Y. (2021a). Does Intellectual Capital Spur Sustainable Competitive Advantage and Sustainable Growth?: A Study of Chinese and Pakistani Firms. *SAGE Open*, 11(1). https://doi.org/10.1177/2158244021996702/ASSET/IMAGES/LARGE/10.1177_2158244021996702-FIG1.JPEG
- Lu, Y., Li, G., Luo, Z., Anwar, M., & Zhang, Y. (2021b). Does Intellectual Capital Spur Sustainable Competitive Advantage and Sustainable Growth?: A Study of Chinese and Pakistani Firms. *SAGE Open*, 11(1). https://doi.org/10.1177/2158244021996702/ASSET/IMAGES/LARGE/10.1177_2158244021996702-FIG1.JPEG
- Ma, Z., Novoselov, K. E., Zhou, K., & Zhou, Y. (2019). Managerial academic experience, external monitoring and financial reporting quality. *Journal of Business Finance & Accounting*, 46(7–8), 843–878. <https://doi.org/10.1111/JBFA.12398>
- Mala, R., & Chand, P. (2015). Judgment and Decision-Making Research in Auditing and Accounting: Future Research Implications of Person, Task, and Environment Perspective. *Accounting Perspectives*, 14(1), 1–50. <https://doi.org/10.1111/1911-3838.12040>
- Meng Chao, Dewi Fariha Abdullah, & Norhalimah Idris. (2020). Investigating the Relationship between Intellectual Capital and Audit Quality Based on China Audit Market. *Journal of Economic Info*, 7(1), 65–75. <https://doi.org/10.31580/JEI.V7I1.1352>
- Moghadam, H. M., Salehi, M., & Hajiha, Z. (2023). The relationship between intellectual capital and financial statements readability: the role of management characteristics. *Journal of Facilities Management*, 21(2), 221–241. <https://doi.org/10.1108/JFM-08-2021-0088/FULL/PDF>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & T. P. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PloS Med*, 6(7). <https://doi.org/https://doi.org/10.1371/journal.pmed1000097e1000097>
- Mökander, J., Morley, J., Taddeo, M., & Floridi, L. (2021). Ethics-Based Auditing of Automated Decision-Making Systems: Nature, Scope, and Limitations. *Science and Engineering Ethics*, 27(4), 1–30. <https://doi.org/10.1007/S11948-021-00319-4/TABLES/2>
- Narwal, K. P., & Yadav, N. (2017). Evaluating intellectual capital and its impact on financial performance: Empirical evidence from Indian electricity, mining and asset financing service sectors. *International Journal of Learning and Intellectual Capital*, 14(4), 319–337. <https://doi.org/10.1504/IJLIC.2017.087376>
- Nicolo', G., Manes-Rossi, F., Christiaens, J., & Aversano, N. (2020). Accountability through intellectual capital disclosure in Italian Universities. *Journal of Management and Governance*, 24(4), 1055–1087. <https://doi.org/10.1007/S10997-019-09497-7/TABLES/7>
- Novas, J. C., Alves, M. do C. G., & Sousa, A. (2017). The role of management accounting systems in the development of intellectual capital. *Journal of Intellectual Capital*, 18(2), 286–315. <https://doi.org/10.1108/JIC-08-2016-0079/FULL/PDF>
- O'Connor, J., French, R., Sherrill, C., & Babcock, G. (2001). Scholarly Productivity in Adapted Physical Activity Pedagogy: A Bibliometric Analysis. *Adapted Physical Activity Quarterly*, 18(4), 434–450. <https://doi.org/10.1123/APAQ.18.4.434>
- Omran, M., Ramdhony, D., Mooneepen, O., & Nursimloo, V. (2021). Integrated reporting and board characteristics: evidence from top Australian listed companies. *Journal of Applied Accounting Research*, 22(4), 732–758. <https://doi.org/10.1108/JAAR-04-2020-0077/FULL/PDF>
- Peprah, V., Buor, D., & Forkuor, D. (2019). Characteristics of informal sector activities and challenges faced by women in Kumasi Metropolis, Ghana. *Cogent Social Sciences*, 5(1), 1656383. <https://doi.org/10.1080/23311886.2019.1656383>
- Pi, T., & Yang, X. (2023). Board culture and bank innovation: Evidence from China. *International Review of Economics & Finance*, 84, 732–755. <https://doi.org/10.1016/J.IREF.2022.12.006>
- Pizzi, S., Venturelli, A., Variale, M., & Macario, G. P. (2021). Assessing the impacts of digital transformation on internal auditing: A bibliometric analysis. *Technology in Society*, 67, 101738. <https://doi.org/10.1016/J.TECHSOC.2021.101738>
- Qiu, L., Yu, R., Hu, F., Zhou, H., & Hu, H. (2023). How can China's medical manufacturing listed firms improve their technological innovation efficiency? An analysis based on a three-stage DEA model and corporate governance configurations. *Technological Forecasting and Social Change*, 194, 122684. <https://doi.org/10.1016/J.TECHFORE.2023.122684>

- Qureshi, M. I., & Khan, N. (2020). Impact of COVID-19 CORONAVIRUS PANDEMIC on sustainable development goals: What we learn from the past and where we are heading? *Systematic Literature Review and Meta-Analysis Journal*, 1(1), 30–47.
- Rahman, M. J., & Liu, H. (2023). Intellectual capital and firm performance: the moderating effect of auditor characteristics. *Asian Review of Accounting*, 31(4), 522–558. <https://doi.org/10.1108/ARA-03-2022-0054/FULL/XML>
- Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., & Koffel, J. B. (2021). PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews. *Systematic Reviews*, 10(1), 39. <https://doi.org/10.1186/s13643-020-01542-z>
- Sayed Hussin, S. A. H., Iskandar, T. M., Saleh, N. M., & Jaffar, R. (2017). Professional skepticism and auditors' assessment of misstatement risks: The moderating effect of experience and time budget pressure. *Economics and Sociology*, 10(4), 225–250. <https://doi.org/10.14254/2071-789X.2017/10-4/17>
- Sengupta, S., & Vaish, A. (2023). A study on social media and higher education during the COVID-19 pandemic. *Universal Access in the Information Society*, 1, 1–23. <https://doi.org/10.1007/S10209-023-00988-X/TABLES/5>
- Shahzad, U., Liu, J., Pang, T., & Luo, F. (2023). Institutional investors and the moral hazards of technology investment: Evidence from China. *Economics of Innovation and New Technology*, 32(2), 223–249. <https://doi.org/10.1080/10438599.2021.1908896>
- Shi, Q., Qiu, W., & Fan, Y. (2020). Economic Policy Uncertainty and the Distribution of Business Operations between Parent Companies and Their Subsidiaries. *Emerging Markets Finance and Trade*, 56(2), 427–456. <https://doi.org/10.1080/1540496X.2019.1700363>
- Shore, C., & Wright, S. (2015). Audit Culture Revisited. <https://doi.org/10.1086/681534>, 56(3), 421–444. <https://doi.org/10.1086/681534>
- Sri, A., & Anis, C. (2021). The Effect of Intellectual Capital and Good Corporate Governance on Financial Performance and Corporate Value: A Case Study in Indonesia. *Jaka ISGIYARTA / Journal of Asian Finance*, 8(4). <https://doi.org/10.13106/jafeb.2021.vol8.no4.0391>
- Stander, J., & Dalla Valle, L. (2017). On enthusing students about big data and social media visualization and analysis using R, RStudio, and RMarkdown. *Journal of Statistics Education*, 25(2), 60–67. https://doi.org/10.1080/10691898.2017.1322474/SUPPL_FILE/UJSE_A_1322474_SM7972.ZIP
- Svanberg, J., & Öhman, P. (2015). Auditors' identification with their clients: Effects on audit quality. *The British Accounting Review*, 47(4), 395–408. <https://doi.org/10.1016/J.BAR.2014.08.003>
- Tarighi, H., Salehi, M., Moradi, M., & Zimon, G. (2022a). Social Capital, Intellectual Capital, and Audit Fee: Conflicting Evidence from Iran. *Economies* 2022, Vol. 10, Page 39, 10(2), 39. <https://doi.org/10.3390/ECONOMIES10020039>
- Tarighi, H., Salehi, M., Moradi, M., & Zimon, G. (2022b). Social Capital, Intellectual Capital, and Audit Fee: Conflicting Evidence from Iran. *Economies* 2022, Vol. 10, Page 39, 10(2), 39. <https://doi.org/10.3390/ECONOMIES10020039>
- Wang, J., Zhang, J., Huang, H., & Zhang, F. (2020). Directors' and officers' liability insurance and firm innovation. *Economic Modelling*, 89, 414–426. <https://doi.org/10.1016/J.ECONMOD.2019.11.011>
- Westermann, K. D., Bedard, J. C., & Earley, C. E. (2015). Learning the “Craft” of Auditing: A Dynamic View of Auditors' On-the-Job Learning. *Contemporary Accounting Research*, 32(3), 864–896. <https://doi.org/10.1111/1911-3846.12107>
- Xiao, P., & Sun, X. (2022). Does internationalization strategy promote enterprise innovation performance? – The moderating effect of environmental complexity. *Managerial and Decision Economics*, 43(6), 1721–1733. <https://doi.org/10.1002/MDE.3482>
- Xu, X. L., Li, J., Wu, D., & Zhang, X. (2021). The intellectual capital efficiency and corporate sustainable growth nexus: comparison from agriculture, tourism and renewable energy sector. *Environment, Development and Sustainability*, 23(11), 16038–16056. <https://doi.org/10.1007/S10668-021-01319-X/TABLES/7>
- Yigitbasioglu, O., Green, P., & Cheung, M. Y. D. (2023). Digital transformation and accountants as advisors. *Accounting, Auditing and Accountability Journal*, 36(1), 209–237. <https://doi.org/10.1108/AAAJ-02-2019-3894/FULL/PDF>
- Yousaf, U. Bin, Ullah, I., Jiang, J., & Wang, M. (2022). The role of board capital in driving green innovation: Evidence from China. *Journal of Behavioral and Experimental Finance*, 35, 100714. <https://doi.org/10.1016/J.JBEF.2022.100714>

- Zaid, M. A. A., Wang, M., & Abuhijleh, S. T. F. (2019a). The effect of corporate governance practices on corporate social responsibility disclosure: Evidence from Palestine. *Journal of Global Responsibility*, 10(2), 134–160. <https://doi.org/10.1108/JGR-10-2018-0053/FULL/PDF>
- Zaid, M. A. A., Wang, M., & Abuhijleh, S. T. F. (2019b). The effect of corporate governance practices on corporate social responsibility disclosure: Evidence from Palestine. *Journal of Global Responsibility*, 10(2), 134–160. <https://doi.org/10.1108/JGR-10-2018-0053/FULL/PDF>
- Zgarni, I., Hlioui, K., & Zehri, F. (2016). Effective audit committee, audit quality and earnings management Evidence from Tunisia. *Journal of Accounting in Emerging Economies*, 6(2), 138–155. <https://doi.org/10.1108/JAEE-09-2013-0048/FULL/XML>
- Zhai, Y., Cai, Z., Lin, H., Yuan, M., Mao, Y., & Yu, M. (2022). Does better environmental, social, and governance induce better corporate green innovation: The mediating role of financing constraints. *Corporate Social Responsibility and Environmental Management*, 29(5), 1513–1526. <https://doi.org/10.1002/CSR.2288>
- Zheng, J., Khurram, M. U., & Chen, L. (2022). Can Green Innovation Affect ESG Ratings and Financial Performance? Evidence from Chinese GEM Listed Companies. *Sustainability* 2022, Vol. 14, Page 8677, 14(14), 8677. <https://doi.org/10.3390/SU14148677>