THE IMPACT OF INDEPENDENCE, AUDITORS' COMPETENCE AND INFORMATION TECHNOLOGY USAGE ON INTERNAL AUDIT QUALITY: EMPIRICAL EVIDENCE FROM CHINESE COMMERCIAL BANKS

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OPEN ACCESS

How to cite this paper: Zhang, C., Mohammed Shah, S., Lau, Y. W., & Manisah Ngalim, S. (2024). The impact of independence, auditors' competence and information technology usage on internal audit quality: Empirical evidence from Chinese commercial banks [Special issue]. *Corporate Ownership & Control, 21*(3), 18–30. https://doi.org/10.22495/cocv21i3siart2

ISSN Online: 1810-3057
ISSN Print: 1727-9232

Received: 24.05.2024
Accepted: 30.08.2024

JEL Classification: C51, M42, M48
DOI: 10.22495/cocv21i3siart2

Abstract

The purpose of this article is to study the primary influencing factors of internal audit quality (IAQ) in Chinese commercial banks (CCBs). To achieve this, we first conducted a search on China National Knowledge Infrastructure (CNKI) and identified 64 conceptual articles related to IAQ in CCBs. It is generally believed that the competence of internal auditors (COMP), the independence of internal audit (IND), and information technology usage (ITU) are key factors in improving the quality of internal audits. Secondly, to deeply analyze the impact of these three key factors, we conducted a questionnaire survey in CCBs. The questionnaire data verified that the impact of these three factors on IAQ is significant through the partial least squares structural equation modeling (PLS-SEM) method.

Keywords: Independence, Competence, Information Technology, Internal Audit Quality

Authors' individual contribution: Conceptualization — C.Z., S.M.S., Y.W.L., and S.M.N.; Methodology — C.Z.; Formal Analysis — C.Z.; Investigation — C.Z. and S.M.S.; Data Curation — C.Z.; Writing — Original Draft — C.Z.; Writing — Review & Editing — S.M.S. and C.Z.; Visualization — C.Z.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Internal audit is an integral part of corporate governance (Deribe & Regasa, 2014), High-quality internal auditing plays a crucial role in accountability, transparency, and the protection of public assets (Hazaea et al., 2020). The quality of internal auditing is crucial to the interests of shareholders in publicly listed companies (Gramling & Vandervelde, 2006). High-quality internal audits provide valuable assurance and insights to management and stakeholders, contributing to effective governance, risk management, and control processes within an organization (The Institute of Internal Auditors [IIA], n.d.-b).

The internal audit quality (IAQ) research mainly focuses on two aspects: the evaluation methods and criteria of IAQ. The other direction is the view of IAQ and discusses the factors affecting IAQ (Roussy & Perron, 2018). Only by identifying the main factors influencing IAQ can further evaluation of IAQ be carried out.

IAQ evaluation is based on scientific and accurate quality evaluation indicators (Kai et al., 2022). Roussy and Brivot (2016) summarized the understanding of IAQ from internal auditors, audit committee members, external auditors, and internal audit associations through interview data, and proposed four evaluation frameworks. Trotman and Duncan (2018) studied the views of different stakeholders on IAQ and established a five-dimensional quality evaluation framework with input, process, output, results, and context. Kai et al. (2022) developed a multi-dimensional IAQ assessment framework consisting of five dimensions and 36 indicators: stakeholder satisfaction, stakeholder contribution, financial results, internal audit process, and learning and growth.

There is more literature on indirectly assessing the quality of internal audits through the performance and effectiveness of internal audit functions (Rudhani et al., 2017; Singh et al., 2021). Additional research on the concept of IAQ and its determinants is necessary (Trotman & Duncan, 2018).

Deribe and Regasa (2014) studied the impact of three key factors on IAQ in the Ethiopian commercial banking system: internal audit performance, competence, and the use of information technology (IT). Krichene and Baklouti (2021) confirmed the influence of four factors related to internal auditors on IAQ through a questionnaire method. Kantohe et al. (2021) used the partial least squares structural equation modeling (PLS-SEM) method to confirm the impact of auditors' personal knowledge, experience, communication skills, and self-efficacy on IAQ.

This paper analyzes the factors influencing the IAQ of Chinese commercial banks (CCBs) using bibliometric methods. The three most prominent factors are independence of internal audit (IND), competence of internal auditors (COMP), and information technology usage (ITU). This study quantitatively analyzes the impact of these three factors on IAQ using the PLS-SEM method.

Based on the introduction of the research background, the content of this paper is arranged as follows. Section 2 analyzes the factors influencing IAQ using bibliometric methods and reviews the literature on IAQ, IND, COMP, and ITU while proposing hypotheses. Section 3 introduces the conceptual model of the study, the measurement methods of research variables, and the descriptive statistics of the questionnaire data. Section 4 uses SmartPLS 4.0 to conduct a quantitative analysis of the influencing factors and evaluates the structural equation model. Section 5 analyzes the quantitative results in conjunction with the research hypotheses. Section 6 summarizes the research findings, discusses the limitations of the study, and identifies opportunities for future research.

2. LITERATURE REVIEW

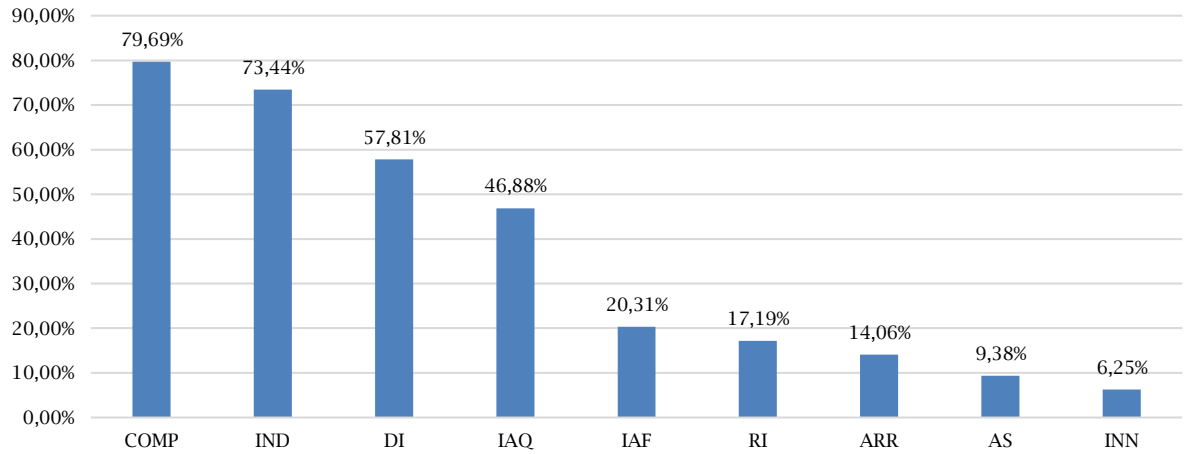
2.1. Analysis of factors affecting internal audit quality

To investigate the quality of internal auditing in CCBs, literature related to the IAQ was searched through the China National Knowledge Infrastructure (CNKI) database, focusing on the articles written by the bank employees and examining their views on the factors affecting IAQ. Then we summarize the main factors affecting IAQ.

The literature data comes from the Chinese CNKI database, search keywords: "bank internal audit" and "audit quality", the time range is from 2019 to March 2024. Sixty-four (64) conceptual documents related to IAQ were selected, including 17 in 2019, 7 in 2020, 14 in 2021, 10 in 2022, 13 in 2023, and 4 in 2024. There were 42 articles from bank employees and 22 from audit researchers. According to the nature of the authors' work, the literature views can objectively reflect the real situation of internal auditing in the banking industry.

A content analysis was conducted on 64 documents, and the current situation of bank internal auditing was summarized into nine major categories of issues, namely, the competence of internal auditors, the independence of the internal audit department, digitalization and informatization, risk identification, understanding of internal auditing function, audit results and suggestions, audit scope and audit innovativeness. The statistics results are shown in the Appendix and the factors statistics are shown in Figure 1.

Figure 1. Literature factors statistics



Source: Authors' visualization.

Regarding the 64 articles, the following issues were identified:

1) Competence of internal auditors (COMP): 79.69% of the articles highlighted insufficient auditor numbers and the need to enhance professional competence.

2) The independence of internal audit (IND): 73.44% of the articles pointed out a lack of independence in internal auditing in commercial banks, with unclear organizational settings and management of audit departments.

3) Digitization and informatization (DI): 57.81% of the articles indicated outdated audit technology and the necessity to improve digitization to adapt to developments in digital currency, big data, cloud computing, and artificial intelligence technologies.

4) Internal audit quality (IAQ): 46.88% of the articles mentioned a lack of internal auditing quality management and even the absence of internal auditing quality assessment mechanisms.

5) Understanding of the internal audit function (IAF): 20.31% of the articles noted unclear responsibilities and objectives of internal auditing by management, leading to limitations or overstepping of internal auditing responsibilities and inadequate resource allocation.

6) Risk identification (RI): 17.19% of the articles pointed out insufficient capabilities in identifying and addressing risks by internal auditing.

7) Audit results and recommendations (ARR): 14.06% of the articles indicated a lack of emphasis by management on audit results and recommendations, or even non-adoption.

8) Auditing scope (AS): 9.38% of the articles mentioned a limited coverage of internal auditing scope, not encompassing various aspects of internal control within the company.

9) Innovativeness (INN): 6.2% of the articles highlighted insufficient audit innovativeness, especially in terms of inadequate understanding of new financial technologies.

The 64 literature statistics show that the most critical factors affecting the quality of internal audit are IND, COMP, and ITU.

2.2. Internal audit quality

The internal audit activity must be independent, and internal auditors must be objective in performing their work. Audit quality gauges how closely the audit findings align with established standards. The IAQ is about how internal auditors perform their tasks and assess processes based on established procedures or standards. The IAQ measures the degree of consistency between audit results and audit standards, and internal auditors must remain objective throughout the audit process (Nguyen et al., 2020). When carrying out tasks, internal auditors need to follow predefined workflows and standards, with audit quality assessing the level of adherence to these processes (Cohen & Sayag, 2010).

There is currently no universally accepted definition for IAQ. However, it can be described as the ability of a firm's internal auditors and audit team members to have the necessary knowledge, skills, and competencies to perform their functions, tasks, and responsibilities effectively. This ensures they meet the objectives and standards of internal audit, as well as comply with relevant regulations (Prawitt et al., 2009). In other words, it refers to the proficiency and capability of internal audit personnel in fulfilling their duties following established standards and regulations. Another perspective on IAQ encompasses various stages of the audit process, including planning, supervision, fieldwork, documentation, reporting, identification of findings, formulation of recommendations, and subsequent follow-up activities (Endaya & Hanefah, 2013). In essence, it encompasses the thoroughness, effectiveness, and professionalism demonstrated throughout the entirety of the audit engagement. The quality of audit work as the extent to which it conforms to internal auditing standards (Tackie et al., 2016). O'Sullivan (2000) has empirically studied the relationship between the proportion of independent directors and the quality of internal audits, finding that a higher proportion of independent directors is significantly associated with improved IAQ.

IAQ refers to the degree to which internal audit activities, processes, and outcomes meet or exceed established standards, expectations, and objectives. It encompasses various aspects such as effectiveness, efficiency, independence, objectivity, relevance, reliability, and impact.

After understanding the concept of IAQ, what factors need to be analyzed that affect IAQ? The research by Deribe and Regasa (2014) shows that the performance of internal auditors, COMP, and access to IT by internal auditors are key factors in IAQ. Al Matarneh's (2011) study shows factors of competence, the objectivity of internal auditors, and the performance of internal auditing affecting IAQ. Singh et al. (2021) explored the impact of independence, objectivity, and competence on IAQ.

IND has a positive effect on IAQ (Yazid & Wiyantoro, 2018; Al Matarneh, 2011; Krichene & Baklouti, 2021; Roussy & Brivot, 2016; Abbott et al., 2016; El Gharbaoui & Chraibi, 2021). COMP has a positive effect on the quality of internal audits (Al Matarneh, 2011; Singh et al., 2021; Deribe & Regasa, 2014; El Gharbaoui & Chraibi, 2021; Abbott et al., 2016). ITU has a positive effect on the quality of internal audits (Deribe & Regasa, 2014; Crucean & Hategan, 2019; Moorthy et al., 2011; Ababnehi & Alrabei, 2021; Awuah et al., 2015).

2.3. The independence of internal audit

In recent years, there has been growing attention to the independence and objectivity of internal audits. This heightened research interest is due to the expanding role of internal audit, which functions not only as a vital part of corporate governance but also as an internal consulting service (Stewart & Subramaniam, 2010). Moeller (2015) believes that independence should not be compromised by the interests of stakeholders. To maintain objectivity, effective management of individual auditors, audit participants, and organizers is necessary.

Internal audit functions and internal auditors should maintain independence and objectivity and shall not be responsible for the decision-making and execution of the business activities, internal controls, and risk management of the audited entity (IIA, n.d.-a). The IIA emphasizes that IAF must be granted suitable stature within the organization to

facilitate organizational independence and enable individual internal auditors to maintain objectivity. This is crucial because internal auditors occupy a distinct position as employees of the organization tasked with evaluating and overseeing management decisions, as well as advising on the sufficiency and efficiency of internal controls (Sarens & De Beelde, 2006).

The likelihood of internal auditors discovering violations, fraud, and misstatements depends on their level of competence. At the same time, the independence of internal auditors ensures the objectivity of their assessments, free from bias or prejudice (Carolina, 2013). Internal auditors serve as independent, objective evaluators who evaluate not only an organization's operations and internal controls but also its performance.

Agency theory posits that conflicts of interest exist between principals and agents, which can be mitigated through monitoring costs. One of the monitoring costs is the existence of a good corporate governance structure including the existence of an internal auditor (Khalid & Sarea, 2021). Roussy and Brivot's (2016) research on the public sector found that when the internal audit is managed by senior management, the work of both the IAF and the audit committee is of higher quality. IND will have a certain impact on audit activities. Internal audit needs to report to corporate management to ensure the audit scope and implementation of audit opinions (Penno, 1990).

When the audit committee directly manages and controls the audit department, the independence is more prominent, and IAQ is also improved. Furthermore, the analysis also reveals that the higher IND department, the stronger its ability in internal control, leading to more ideal internal control effectiveness, and consequently, enhancing overall corporate performance (Gordon & Smith, 1992).

The empirical research findings indicate that when internal auditors maintain good communication with senior management or receive support from them, IAQ improves, which in turn benefits the enhancement of corporate performance. Moreover, if senior management highly recognizes and actively supports internal audit work, it naturally leads to improved operational effectiveness and efficiency within the organization, consequently resulting in enhanced corporate performance (Sarens & De Beelde, 2006).

Based on previous research and surveys conducted in CCBs, the first hypothesis is proposed.

H1: The independence of internal audit (IND) is related positively with internal audit quality (IAQ).

2.4. The competence of internal auditors

The competence of an internal auditor (COMP) refers to the knowledge and skills required to effectively perform the tasks associated with their role (Arens et al., 2012). Ricchiute (2003) suggests that assessing competence involves factors such as the educational background, professional experience, certifications, and ongoing education of internal auditors. Novyarni's (2014) principle of competence states: providing internal audit services based on knowledge, skills, and experience, following professional standards, to enhance proficiency and the effectiveness and quality of services.

Boynton et al. (2002) suggested that competence is derived from both education and experience. Education starts with initial preparation for entering the profession and continues with ongoing professional education as individuals progress in their careers. Experience includes internships and increased acceptance of responsibility for the professional age members. Van Gelderen et al. (2018) research findings indicate that the effectiveness of internal audit is contingent upon the proficiency of auditors, which can be enhanced through training and assessment of their competencies and skills. A high standard of internal audit is attainable through COMP, the assurance level, and the follow-up procedures implemented, along with the audit committee's role in evaluating and scrutinizing internal audit outcomes (Ratri & Bernawati, 2020).

Today's internal auditors need to continually enhance their arsenal of technical skills, competencies, and behavioral traits to adapt to the constantly evolving nature of their role. To stay effective, they need to integrate the skills of a statistician, negotiator, and private investigator with the abilities of a corporate executive, computer programmer, and politician (Common Body of Knowledge — CBOK).

In the context of audit work, both cognitive skills and behavioral skills are deemed crucial. Cognitive skills encompass abilities such as numeracy, IT literacy, precision, problem-solving, and so on. On the other hand, behavioral aspects encompass traits like morality, inquisitiveness, balance, flexibility, and so on. Consequently, the modern auditor is adept at navigating defined pathways and resolving issues through analytical thinking and sound judgment (Pickett, 2000).

Coetzee et al. (2015) conducted a comparative analysis of auditors from four regions (South Africa, the UK and Ireland, and Australia) in terms of general competencies (consisting of 11 indicators) and behavioral skills (consisting of 15 indicators). This study provides help in evaluating COMP.

Based on previous research and surveys conducted in CCBs, the second hypothesis is proposed.

H2: The competence of internal auditors (COMP) is related positively with internal audit quality (IAQ).

2.5. Information technology usage

Discussions about the impact of IT and office automation on audit quality have been increasing (Crucean & Hategan, 2023). During the COVID-19 pandemic in 2020, auditors were forced to use online platforms for remote audits, leading to significant changes in audit processes, financial data auditing, and risk identification methods.

IT plays a pivotal role in elevating audit quality and effectiveness, revolutionizing traditional audit methodologies towards a more digital-centric approach. Embracing digital technology significantly enhances the reliability, accuracy, and efficiency of audits while empowering auditors to identify errors and misstatements more effectively. In essence, the advent of new technologies heralds a paradigm shift in auditing, driving greater efficiency, precision, and agility in audit processes. As auditors harness the capabilities of digital tools and

analytics, they can delve deeper into datasets, uncover insights, and deliver more value-added audit services to stakeholders. Consequently, this evolution is expected to foster a more collaborative environment within the audit profession, enabling auditors to work seamlessly across diverse platforms and jurisdictions to achieve enhanced audit outcomes (Damerji, 2019).

IT adoption by audit firms can significantly enhance their efficiency. Computerized audit software, along with computer-assisted audit techniques (CAATs) and other tools, are indispensable for auditors. They serve as mechanisms that enable auditors to achieve objectives with greater efficiency, quality, and reliability in data analysis and evidence collection (Marei, 2023).

As a new form of productivity, CAATs not only enhance the productivity of the audit department but also significantly improve efficiency in audit planning, audit execution, audit reporting, and continuous auditing (Pedrosa & Costa, 2012).

Digital transformation refers to the strategic adoption of digital technologies to innovate and evolve business processes, culture, and customer experiences in response to shifting market demands. It entails a comprehensive reassessment of how an organization leverages technology, human resources, and operational workflows to develop novel business models and revenue streams. Central to digital transformation is the recognition of evolving customer expectations for products and services, driving a fundamental reimagining of organizational strategies and operations (Peter et al., 2020).

The characteristics of IT include efficient information storage, management, and retrieval capabilities. Auditors can easily access firm data, use auditing tools to conduct their work, and communicate conveniently with team members, supervisory bodies, and auditees, facilitating the smooth completion of the audit process. Company management can use IT platforms to understand work plans and procedures, communicate with employees in real-time, and reduce fraud and corruption (Zahid et al., 2019).

With the development of computer network technology, resource sharing has become a reality. Under authorized conditions, various resources can be utilized, and valuable discoveries can be shared. Digital platforms, collaboration tools, and communication technologies have democratized access to information, enabling seamless sharing and collaboration regardless of physical location (Pedrosa & Costa, 2012).

Auditing is the product of agency, and its purpose is to solve the problem of information asymmetry between capital and management. Managers may possess private information that employers do not, creating information asymmetry. Auditors can partially solve the problem of information asymmetry by obtaining partial information by reviewing company operations or financial statements (Bergh et al., 2019). The systems of IT can promote transparency by providing real-time data and information sharing. IT indeed has the potential to significantly mitigate the issue of information asymmetry. Blockchain, a decentralized ledger technology, offers transparency and immutability of transactions. It can be used to verify the authenticity of information and ensure trust in transactions, reducing asymmetries in trust and information in various sectors (Xiao et al., 1998).

Auditors must possess the necessary knowledge and skills to fulfill their duties effectively. In the era of widespread IT application, auditors must be proficient in IT professional skills and use new technologies to enhance work efficiency. IT can also introduce data security and management risks (Le Grand et al., 2013).

To further confirm the impact of ITU on IAQ, the third hypothesis is proposed:

H3: Information technology usage (ITU) is related positively with internal audit quality (IAQ).

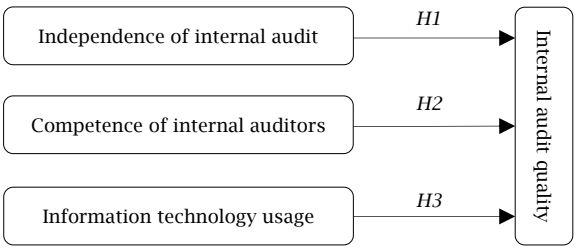
3. RESEARCH METHODOLOGY

Quantitative studies used the PLS-SEM method and data were obtained from a questionnaire in CCBs. The PLS-SEM is called the second-generation statistical technology, which is more suitable for exploratory research than covariance based structural equation modeling (CB-SEM), and has loose restrictions on data samples, which can be small size and non-normal distributions (Hair et al., 2014). Tool selection popular SmartPLS 4.0.

3.1. Model specification

Based on an analysis of factors influencing *IAQ*, three latent variables — *IND*, *COMP*, and *ITU* — were selected for investigation to verify their impact on *IAQ*. The questionnaire was designed using a 6-Likert scale format. The conceptual model design contains only three paths, as shown in Figure 2. The observed indicators of each latent variable are reflective.

Figure 2. Conceptual model



Source: Authors' visualization.

3.2. Measurement of latent variables

The structure model consists of four constructs, which are measured by reflective indicators. All the measures are adapted from prior research. The reflective indicators for *IAQ*, *IND*, and *COMP* are adapted from Singh et al. (2021) and measured through six items, eight items, and four items, respectively. Simultaneously, the construct of *ITU* is measured by three items adapted from Veerankutty et al. (2018). The questionnaires were anchored on a 6-Likert scale ranging from (1) strongly disagree to (6) strongly agree.

3.3. Questionnaire data

The questionnaire was designed according to the variables studied and their measurement indicators, and the survey scope was limited to the Chinese commercial banking system. A total of 193 response data were collected both online and offline. After excluding 57 invalid questionnaires, 136 valid questionnaires remained. Table 1 shows the respondents' demographic information, and Table 2 presents the descriptive statistics of items.

Table 1. Respondents' demographic information

Respondent information		*Observation*	*Percentage*
Gender	Male	64	47.06%
	Female	72	52.94%
	Total	**136**	**100.00%**
Education degree	Bachelor	83	61.03%
	Master	53	38.97%
	Total	**136**	**100.00%**
Professional certificate	CPA/CIA	69	50.74%
	Intermediate auditor	38	27.94%
	No	29	21.32%
	Total	**136**	**100.00%**
Working position	Senior internal auditor	37	27.21%
	Department head/deputy head	34	25.00%
	Internal auditor	52	38.24%
	Internal auditor assistance	13	9.56%
	Total	**136**	**100.00%**
Working experience (WE)	WE < 5 years	33	24.26%
	5 years <= WE < 10 years	72	52.94%
	WE > 10 years	31	22.79%
	Total	**136**	**100.00%**
Department establishment time (DET)	DET < 5 years	17	12.50%
	5 years <= DET < 10 years	76	55.88%
	DET > 10 years	43	31.62%
	Total	**136**	**100.00%**

Source: Authors' calculations.

Table 2. Descriptive statistics of items

Items	*Coding*	*Mean*	*Standard deviation*	*Excess kurtosis*	*Skewness*
Whether the annual internal audit plan is entirely determined by the auditor.	IAQ1	5.007	0.862	2.686	-1.130
Is the content of the audit critical to the organization?	IAQ2	5.176	0.695	-0.393	-0.388
Does internal audit cover the entire organization?	IAQ3	5.147	0.800	4.597	-1.406
Is the auditee's written response comprehensive?	IAQ4	5.206	0.778	5.486	-1.518
The internal audit staff regularly follow up, inspect, and correct the issues identified.	IAQ5	5.140	0.788	4.987	-1.442
Whether internal auditors also perform other activities, such as developing procedures and conducting financial and economic audits.	IAQ6	5.250	0.694	0.885	-0.784
Whether internal audit operates completely independently and can audit any issue it deems warrants audit.	IND1	5.265	0.678	0.507	-0.672
Does internal audit have access to any necessary information, even if it is confidential?	IND2	5.294	0.666	0.720	-0.722
Is the internal audit team rotated frequently so that they can take on a variety of tasks?	IND3	5.140	0.815	4.068	-1.335
Does the chief audit executive have reporting responsibilities to the board of directors?	IND4	5.235	0.740	2.668	-1.181
Does the chief audit executive maintain a regular, direct working relationship with the CEO and management team?	IND5	5.243	0.636	0.182	-0.433
Does terminating the internal auditor's job require an audit committee?	IND6	5.309	0.712	3.265	-1.274
Can audit committee retrieve and download data from all databases of the organization?	IND7	5.279	0.661	0.744	-0.689
Can internal audit be involved in designing organizational systems and procedures?	IND8	5.346	0.623	-0.651	-0.410
Should internal auditors have the necessary academic qualifications?	COMP1	5.154	0.726	0.212	-0.596
Should internal auditors have professional qualifications in internal auditing?	COMP2	5.309	0.733	2.243	-1.127
Should internal auditors commit to continuing professional development?	COMP3	5.324	0.629	0.304	-0.562
Should internal auditors have some work experience in the internal audit field?	COMP4	5.309	0.659	0.052	-0.590
Are internal auditors assisted by strong IT support from IT technical staff?	ITU1	4.934	1.158	2.462	-1.564
Do internal auditors aid through internal audit techniques?	ITU2	4.500	1.409	0.042	-0.941
Do internal auditors aid by external IT support?	ITU3	4.816	1.238	1.634	-1.385

Source: Authors' calculations.

4. RESEARCH RESULTS

4.1. Measurement model assessment

The evaluation of the structural equation modeling is divided into two steps: measurement model evaluation and structural model evaluation. The main indicators of the measurement model evaluation include factor loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity. Table 3 lists all the metrics of the measured model.

The factor loadings of all items range from 0.743 to 0.897, all factor loadings above 0.7, and indicated items can well explain the corresponding latent variance. The Cronbach's alpha values greater than 0.856 indicate good or excellent reliability. The CR values reflect whether the items of each latent variable consistently explain the latent variable. The CR values above 0.866 exceed the recommended threshold of 0.7. The AVE values of each construct exceed 0.5 indicate (Hair et al., 2014). AVE measures convergent validity, and the AVE values above 0.713 exceed the recommended threshold of 0.5.

Table 3. Measurement model assessment

Constructs	*Items*	*Loadings*	*Cronbach's alpha*	*CR*	*AVE*
Internal audit quality	IAQ1	0.880	0.920	0.920	0.717
	IAQ2	0.782			
	IAQ3	0.892			
	IAQ4	0.863			
	IAQ5	0.873			
	IAQ6	0.782			
Independence of internal audit	IND1	0.822	0.942	0.944	0.714
	IND2	0.892			
	IND3	0.743			
	IND4	0.846			
	IND5	0.831			
	IND6	0.857			
	IND7	0.888			
	IND8	0.869			
Competence of internal auditors	COMP1	0.786	0.865	0.866	0.713
	COMP2	0.836			
	COMP3	0.878			
	COMP4	0.874			
Information technology usage	ITU1	0.867	0.856	0.873	0.775
	ITU2	0.877			
	ITU3	0.897			

Source: Authors' calculations.

The discriminant validity is the assessment of whether different constructs in the model are distinguishable (Hair et al., 2014). The discriminant validity is usually assessed in three ways: the Fornell-Larcker criterion, the Heterotrait-Monotrait ratio (HTMT) criterion, and cross-loading. Any criterion can be used as a basis for judging discriminant validity.

According to the HTMT criterion, Table 4 shows that there are no values regarding the HTMT ratio approaching or exceeding 0.85. This presents that the discriminant validity is not violated (Henseler et al., 2016). Table 5 shows the Fornell-Larcker criterion of discriminant validity. The element value of the diagonal is greater than the other element values in its rows and columns (Fornell & Larcker, 1981), it is also verified that the research model has good discriminant validity.

Table 4. Heterotrait-Monotrait ratio of discriminant validity

	COMP	*IAQ*	*IND*	*ITU*
COMP				
IAQ	0.805			
IND	0.796	0.735		
ITU	0.404	0.614	0.396	

Source: Authors' calculations.

Table 5. Fornell-Larcker criterion of discriminant validity

	COMP	*IAQ*	*IND*	*ITU*
COMP	**0.845**			
IAQ	0.763	**0.847**		
IND	0.722	0.693	**0.845**	
ITU	0.346	0.553	0.359	**0.881**

Source: Authors' calculations.

4.2. Structure model assessment

The assessment of the structure model is based on the following parameters: R^2 and Q^2. In PLS-SEM, R^2 represents the explanatory power of endogenous latent variables in the structural model, where $0 < R^2 <= 1$, the larger the R^2 value, the better the explanatory power of the table model. When the R^2 value is close to 0.25, the model is considered as weak explanatory power. When the R^2 value is close to 0.5, the model has moderate explanatory power. When the R^2 value is close to 0.75, the model explanatory power is more significant (Hair et al, 2014). Q^2 value determines the prediction power of the structure model, $Q^2 > 0$, good; $Q^2 <= 0$, poor model prediction power. Table 6 shows an R^2 value of 0.702 and a Q^2 value of 0.487, so the structural models have significant explanatory power and good relevant predictive power (Chin, 1998; Hair et al, 2014).

Table 6. R^2 and Q^2

	R^2	*R^2-adjusted*	*Q^2 (= 1-SSE/SSO)*
IAQ	0.702	0.695	0.487

Source: Authors' calculations.

4.3. Hypothesis test results

The hypothesis test level is 5% and the test results for all path relationships are shown in Table 7. The hypothesis test results indicate that all paths in the structural model are significant, supporting the proposed hypotheses *H1*, *H2*, and *H3*. The test also showed that all factor loadings of all items are also significant (p = 0.05).

Table 7. Total effects

Path	*Original sample*	*Sample mean*	*Standard deviation*	*T statistics*	*p-values*	*Test*
COMP -> IAQ	0.495	0.500	0.098	5.068	0.000	supported
IND -> IAQ	0.229	0.231	0.093	2.453	0.014	supported
ITU -> IAQ	0.300	0.297	0.075	4.020	0.000	supported

Notes: p < 0.05, two tails.
Source: Authors' calculations.

5. DISCUSSION OF THE RESULTS

Among the many factors influencing IAQ, COMP is a decisive factor. In the analyzed literature, 79.69% of the documents indicate that internal auditors have a significant impact on IAQ. The quantitative analysis results also show that COMP has a significant and positive impact on IAQ, supporting the proposed hypothesis *H1*. Therefore, building a competent team of auditors is fundamental to improving audit quality. Auditors must not only possess professional knowledge but also uphold high ethical standards. Continuous updating of knowledge and skills to adapt to new management environments is essential.

Internal auditing in CCBs is still in the development stage. Although internal audit departments have been established under the requirements of financial regulatory agencies, their independence is insufficient. In the literature analysis, 73.44% of the authors believe that independence needs to be improved. The quantitative analysis also confirms that independence has a significant positive impact on IAQ, supporting the proposed hypothesis *H2*. Therefore, establishing an independent audit department is essential to ensure the objectivity and effectiveness of internal audits. CCBs have established audit institutions, but true independence, free from internal and external influences, is necessary to enhance audit quality and effectiveness.

In recent years, the development of IT in CCBs has been rapid. Remote auditing can be conducted on private cloud computing platforms, which also assist in the audit process. The use of IT has improved work efficiency and audit quality. In the literature analysis, 57.81% of the authors focused on digital and information factors. The quantitative analysis also verified that ITU has a significant positive impact on IAQ, supporting the proposed hypothesis *H3*. The application of IT relies on the support of the technology department and the skill updates of internal auditors and related personnel.

6. CONCLUSION

This study argues from two perspectives that enhancing the quality of internal audit requires an independent internal audit institution, a professional team of auditors, and efficient IT platforms and tools. The statistical data from 136 questionnaires in CCBs once again reflect the actual relationships between the independence of internal audit, COMP, ITU, and IAQ. The validation results indicate that IND, COMP, and ITU significantly influence IAQ.

This research can help commercial banks further understand the important factors affecting IAQ and promote the improvement of IAQ. In summary, the independence of internal audit is the mechanism guarantee for audit quality, auditors are the decisive factor in IAQ, and the use of IT is an important means to enhance audit efficiency and improve audit processes.

The limitation of this study is that only the three main factors affecting the IAQ were considered, while there are many other factors affecting the IAQ. The research is limited to the commercial banking sector, and whether the influencing factors of IAQ are consistent in other industries remains to be further studied. Additionally, this study only considers the direct impact of three factors on IAQ, while in practice, many factors interact with each other, potentially having moderating and mediating relationships. IAQ is not only related to the internal governance environment but is also influenced by the external environment. These provide clues for future research.

REFERENCES

Ababnehi, D. S., & Alrabei, A. M. (2021). The moderating effect of information technology on the relationship between audit quality and the quality of accounting information "Jordanian auditors perception". *Journal of Theoretical and Applied Information Technology, 99*(14), 3365–3378. https://www.jatit.org/volumes/Vol99No14/1Vol99No14.pdf

Abbott, L. J., Daugherty, B., Parker, S., & Peters, G. F. (2016). Internal audit quality and financial reporting quality: The joint importance of independence and competence. *Journal of Accounting Research,* 54(1), 3–40. https://doi.org/10.1111/1475-679X.12099

Al Matarneh, G. F. (2011). Factors determining the internal audit quality in banks: Empirical Evidence from Jordan. *International Research Journal of Finance and Economics, 73*(9), 110–119. https://www.academia.edu/8488336/Factors_Determining_the_Internal_Audit_Quality_in_Banks

Arens, A. A., Elder, R. J., & Beasley, M. S. (2012). *Auditing and assurance services: An integrated approach* (14th ed.). Prentice Hall. https://bayanbox.ir/view/1232155917207355575/AUDITING-AND-ASSURANCE-SERVICES.pdf

Awuah, P. K., Abariga, A. A., & Zayzay, G. (2015). Factors determining internal audit quality in the Ghanaian public sector. *ADRRI Journal, 24*(24), 1–15. https://journals.adrri.org/index.php/adrrij/article/view/222

Bergh, D. D., Ketchen, D. J., Jr., Orlandi, I., Heugens, P. P., & Boyd, B. K. (2019). Information asymmetry in management research: Past accomplishments and future opportunities. *Journal of Management, 45*(1), 122–158. https://doi.org/10.1177/0149206318798026

Boynton, W. C., Johnson, R. N., & Kell, W. G. (2002). *Auditoria* (J. E. dos Santos, Trans.) Atlas.

Carolina, Y. (2013, October 2–4). *An empirical study of auditor independence, competence and audit tenure on audit quality — Evidence from North Jakarta, Indonesia* [Paper presentation]. The 2nd IBSM, International Conference on Business and Management, Chiang Mai, Bangkok. https://www.caal-inteduorg.com/proceedings/ibsm2/FP47-Yenni_Carolina--An_Empirical_Study_of.pdf

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research, 295*(2), 295–336. https://www.researchgate.net/publication/311766005_The_Partial_Least_Squares_Approach_to_Structural_Equation_Modeling

Coetzee, P., Erasmus, L. J., & Plant, K. (2015). Global assessment of internal audit competence: Does one size fit all? *Southern African Business Review, 19*(1), 1–21. https://doi.org/10.25159/1998-8125/5802

Cohen, A., & Sayag, G. (2010). The effectiveness of internal auditing: An empirical examination of its determinants in Israeli organisations. *Australian Accounting Review, 20*(3), 296–307. https://doi.org/10.1111/j.1835-2561.2010.00092.x

Crucean, A. C., & Hategan, C. D. (2019). The determinants factors on audit quality: A theoretical approach. *Ovidius University Annals, Economic Sciences Series, 19*(2), 702–710. https://stec.univ-ovidius.ro/html/anale/RO/wp-content/uploads/2020/02/Section%20V/13.pdf

Crucean, A. C., & Hategan, C. D. (2023). Impact of information technology on audit quality: European listed companies' evidence. In S. Grima, K. Sood, & E. Özen (Eds.), *Contemporary studies of risks in emerging technology* (Part B, pp. 327–339). Emerald Publishing Limited. https://doi.org/10.1108/978-1-80455-566-820231018

Damerji, H. (2019). *Technology readiness impact on artificial intelligence technology adoption by accounting students* [Doctoral dissertation, University of La Verne]. University of La Verne. https://researchworks.laverne.edu/esploro/outputs/doctoral/Technology-Readiness-Impact-on-Artificial-Intelligence/991004155302906311

Deribe, W. J., & Regasa, D. G. (2014). Factors determining internal audit quality: Empirical evidence from Ethiopian commercial banks. *Research Journal of Finance and Accounting, 5*(23), 86–95. https://www.academia.edu/30329590/Factors_Determining_Internal_Audit_Quality_Empirical_Evidence_from_Ethiopian_Commercial_Banks

El Gharbaoui, B., & Chraibi, A. (2021). Internal audit quality and financial performance: A systematic literature review pointing to new research opportunities. *Revue Internationale des Sciences de Gestion, 4*(2). https://revue-isg.com/index.php/home/article/view/608

Endaya, K. A., & Hanefah, M. M. (2013). Internal audit effectiveness: An approach proposition to develop the theoretical framework. *Research Journal of Finance and Accounting, 4*(10), 92–102. https://www.researchgate.net/publication/328095795_Internal_Audit_Effectiveness_An_Approach_Proposition_to_Develop_the_Theoretical_Framework

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.2307/3151312

Gordon, L. A., & Smith, K. J. (1992). Postauditing capital expenditures and firm performance: the role of asymmetric information. *Accounting, Organizations and Society, 17*(8), 741–757. https://doi.org/10.1016/0361-3682(92)90002-A

Gramling, A. A., & Vandervelde, S. D. (2006). Assessing internal audit quality. *Internal Auditing, 21*(3), 26–30. https://digitalcommons.kennesaw.edu/facpubs/1332/

Hair, J., Jr., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review, 26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Hazaea, S. A., Tabash, M. I., Khatib, S. F., Zhu, J., & Al-Kuhali, A. A. (2020). The impact of internal audit quality on financial performance of Yemeni commercial banks: An empirical investigation. *The Journal of Asian Finance, Economics and Business, 7*(11), 867–875. https://doi.org/10.13106/jafeb.2020.vol7.no11.867

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management & Data Systems, 116*(1), 2–20. https://doi.org/10.1108/IMDS-09-2015-0382

Kai, R., Yusheng, K., Ntarmah, A. H., & Ti, C. (2022). Constructing internal audit quality evaluation index: Evidence from listed companies in Jiangsu province, China. *Heliyon, 8*(9), Article E10598. https://doi.org/10.1016/j.heliyon.2022.e10598

Kantohe, M. S., Sudarma, M., Subekti, I., & Adib, N. (2021). Determinants of internal audit quality in provincial government. *Turkish Online Journal of Qualitative Inquiry, 12*(6), 684–694. https://www.tojqi.net/index.php/journal/article/view/1202

Khalid, A. A., & Sarea, A. M. (2021). Independence and effectiveness in internal Shariah audit with insights drawn from Islamic agency theory. *International Journal of Law and Management, 63*(3), 332–346. https://doi.org/10.1108/IJLMA-02-2020-0056

Krichene, A., & Baklouti, E. (2021). Internal audit quality: Perceptions of Tunisian internal auditors an explanatory research. *Journal of Financial Reporting and Accounting, 19*(1), 28–54. https://doi.org/10.1108/JFRA-01-2020-0010

Le Grand, S., Götz, A. W., & Walker, R. C. (2013). SPFP: Speed without compromise — A mixed precision model for GPU accelerated molecular dynamics simulations. *Computer Physics Communications, 184*(2), 374–380. https://doi.org/10.1016/j.cpc.2012.09.022

Marei, A. (2023). The moderating role of big data and user satisfaction in the predictors of generalized audit software among Jordanian auditing firms. *WSEAS Transactions on Business and Economics, 20*, 1357–1367. https://doi.org/10.37394/23207.2023.20.121

Moeller, R. R. (2015). *Brink's modern internal auditing: A common body of knowledge*. John Wiley & Sons.

Moorthy, M. K., Mohamed, A. S. Z., Gopalan, M., & San, L. H. (2011). The impact of information technology on internal auditing. *African Journal of Business Management, 5*(9), 3523–3539. https://www.researchgate.net/profile/Zulkifflee-Mohamed/publication/234077148_The_Impact_of_Information_Technology_on_Internal_Auditing/links/09e4150ee08596bc94000000/The-Impact-of-Information-Technology-on-Internal-Auditing.pdf

Nguyen, T. M. H., To, Y. N., & Nguyen, T. L. H. (2020). Auditing quality from perspective of auditing firms in Vietnam. *Accounting, 6*(5), 763–772. https://doi.org/10.5267/j.ac.2020.6.007

Novyarni, N. (2014). Influence of internal auditor competence and independence on the quality of financial reporting by municipal/provincial government. *International Journal of Economics, Commerce and Management, 2*(10), 1–13. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=308df784af4656ee0d3f293ac34110d4498bb457

O'Sullivan, N. (2000). The impact of board composition and ownership on audit quality: Evidence from large UK companies. *The British Accounting Review, 32*(4), 397–414. https://doi.org/10.1006/bare.2000.0139

Pedrosa, I., & Costa, C. J. (2012). Computer assisted audit tools and techniques in real world: CAATT's applications and approaches in context. *International Journal of Computer Information Systems and Industrial Management Applications, 4,* 161–168. https://www.researchgate.net/publication/261250562_Computer_Assisted_Audit_Tools_and_Techniques_in_Real_World_CAATT's_Applications_and_Approaches_in_Context

Penno, M. (1990). Auditing for performance evaluation. *The Accounting Review, 65*(3), 520–536. https://cpb-us-w2.wpmucdn.com/u.osu.edu/dist/8/36875/files/2018/06/Penno_Aud_for_Perf_Eval-zs4igf.pdf

Peter, M. K., Kraft, C., & Lindeque, J. (2020). Strategic action fields of digital transformation: An exploration of the strategic action fields of Swiss SMEs and large enterprises. *Journal of Strategy and Management, 13*(1), 160–180. https://doi.org/10.1108/JSMA-05-2019-0070

Pickett, S. (2000). Developing internal audit competencies. *Managerial Auditing Journal, 15*(6), 265–278. https://doi.org/10.1108/02686900010344179

Prawitt, D. F., Smith, J. L., & Wood, D. A. (2009). Internal audit quality and earnings management. *The Accounting Review, 84*(4), 1255–1280. https://doi.org/10.2308/accr.2009.84.4.1255

Ratri, M. C., & Bernawati, Y. (2020). Penerapan standar profesional audit internal dan kualitas audiT: Sebuah tinjauan literatur. *Jurnal Bisnis Dan Akuntansi, 22*(1), 47–56. https://doi.org/10.34208/jba.v22i1.605

Ricchiute, D. N. (2003). *Auditing and assurance service*s (7th ed.). South Western/Thomson Learning.

Roussy, M., & Brivot, M. (2016). Internal audit quality: A polysemous notion? *Accounting, Auditing & Accountability Journal, 29*(5), 714–738. https://doi.org/10.1108/AAAJ-10-2014-1843

Roussy, M., & Perron, A. (2018). New perspectives in internal audit research: A structured literature review. *Accounting Perspectives, 17*(3), 345–385. https://doi.org/10.1111/1911-3838.12180

Rudhani, L. H., Vokshi, N. B., & Hashani, S. (2017). Factors contributing to the effectiveness of internal audit: Case study of internal audit in the public sector in Kosovo. *Journal of Accounting, Finance and Auditing Studies, 3*(4), 91–108. https://www.um.edu.mt/library/oar/bitstream/123456789/27336/3/Factors_contributing_to_the_effectiveness_of_internal_audit_case_study_of_internal_audit_2017.pdf

Sarens, G., & De Beelde, I. (2006). Building a research model for internal auditing: Insights from literature and theory specification cases. *International Journal of Accounting, Auditing and Performance Evaluation, 3*(4), 452–470. https://doi.org/10.1504/IJAAPE.2006.011206

Singh, K. S. D., Ravindran, S., Ganesan, Y., Abbasi, G. A., & Haron, H. (2021). Antecedents and internal audit quality implications of internal audit effectiveness. *International Journal of Business Science & Applied Management*, *16*(2), 1–21. https://www.business-and-management.org/library/2021/16_2--1-21-Singh,Ravindran,Ganesan,Abbasi,Haron.pdf

Stewart, J., & Subramaniam, N. (2010). Internal audit independence and objectivity: Emerging research opportunities. *Managerial Auditing Journal, 25*(4), 328–360. https://doi.org/10.1108/02686901011034162

Tackie, G., Marfo-Yiadom, E., & Achina, S. O. (2016). Determinants of internal audit effectiveness in decentralized local government administrative systems. *International Journal of Business and Management, 11*(11), 184–165. https://doi.org/10.5539/ijbm.v11n11p184

The Institute of Internal Auditors (IIA). (n.d.-a). *Core principles for the profession of internal auditing*. https://www.theiia.org/en/standards/what-are-the-standards/core-principles/

The Institute of Internal Auditors (IIA). (n.d.-b). *The definition of internal auditing*. https://www.theiia.org/en/standards/what-are-the-standards/definition-of-internal-audit/

Trotman, A. J., & Duncan, K. R. (2018). Internal audit quality: Insights from audit committee members, senior management, and internal auditors. *Auditing: A Journal of Practice & Theory*, *37*(4), 235–259. https://doi.org/10.2308/ajpt-51877

van Gelderen, S. C., Zegers, M., Robben, P. B., Boeijen, W., Westert, G. P., & Wollersheim, H. C. (2018). Important factors for effective patient safety governance auditing: A questionnaire survey. *BMC Health Services Research, 18*, Article 798. https://doi.org/10.1186/s12913-018-3577-9

Veerankutty, F., Ramayah, T., & Ali, N. A. (2018). Information technology governance on audit technology performance among Malaysian public sector auditors. *Social Sciences, 7*(8), Article 124. https://doi.org/10.3390/socsci7080124

Xiao, Z., Powell, P. L., & Dodgson, J. H. (1998). The impact of information technology on information asymmetry. *European Journal of Information Systems, 7*(2), 77–89. https://doi.org/10.1057/palgrave.ejis.3000291

Yazid, H., & Wiyantoro, L. S. (2018). The effect of work experience, internal auditor competence, independence to due professional care and implications in internal audit quality. *Advanced Science Letters, 24*(4), 2565–2568. https://doi.org/10.1166/asl.2018.11006

Zahid, M., Rahman, H. U., Muneer, S., Butt, B. Z., Isah-Chikaji, A., & Memon, M. A. (2019). Nexus between government initiatives, integrated strategies, internal factors and corporate sustainability practices in Malaysia. *Journal of Cleaner Production, 241*, Article 118329. https://doi.org/10.1016/j.jclepro.2019.118329

APPENDIX

Table A.1. Statistics of 64 documents (Part 1)

Title	*Author*	*Source*	*Year*	*COMP*	*IND*	*DI*	*IAQ*	*IAF*	*RI*	*ARR*	*AS*	*INN*
Audit application of information technology methods of the People's Bank of China	Cui Qiang	Qinghai Finance	2019	x		x						
Thoughts on doing a good job in internal auditing of rural banks	Feng Rui	Financial Circles	2019		x		x		x			
Research on optimization of internal audit quality of commercial banks — taking N branch of Bank of China as an example	Gao Ge	Master's thesis of Inner Mongolia University of Finance and Economics	2019	x	x						x	
Research on the informatization of internal audit of the People's Bank of China system	He Xiaoqin	Heilongjiang Finance	2019	x		x						
Discussion on internal audit issues of city commercial banks — taking GZ Bank as an example	Jin Kun	Master's thesis of Jiangxi University of Finance and Economics	2019		x	x				x		
Research on internal audit quality control of commercial banks	Li Hongyan	Guangxi Quality Supervision Herald	2019	x	x	x	x					
Discussion on the issues of Central Bank internal audit informatization construction	Li Jiankui	Financial Economics	2019	x	x	x	x					
Analyze the development trends of internal auditing in commercial banks	Li Qiang	Bohai Rim Economic Outlook	2019	x		x		x			x	
Research on improving the internal audit system of Agricultural Development Bank of China	Luo Yunxiang	Master's thesis of Yunnan University of Finance and Economics	2019	x	x	x		x				x
Internal audit and corporate governance of rural commercial banks	Ma Guangqi	Knowledge Economy	2019	x		x		x				
A brief discussion on the current internal audit issues of banks in my country	Wang Yunlin	Modern Economic Information	2019	x	x						x	
How to solve the internal audit problems of rural commercial banks	Wang Hongping	China Rural Finance	2019	x	x	x				x		
The importance of internal audit to corporate governance of commercial banks	Wang Zhaoqi	Banker	2019	x	x	x		x				
A review of research on internal auditing of commercial banks under the background of transformation	Yan Yutong	China Economic and Trade Guide	2019	x	x	x	x					
Research on the current situation and problems of internal control auditing of commercial banks	Zhang Di	Operation and Management	2019	x		x		x				x
The current situation and transformation and improvement of internal auditing of city commercial banks	Zhang Gaofeng	Guangxi Quality Supervision Herald	2019	x	x			x				
A brief analysis of the internal audit problems and countermeasures of rural commercial banks in J Province	Zhou Qingnan	Master's thesis of Jiangxi University of Finance and Economics	2019	x	x		x					
Discussion on internal audit issues of Shenzhen GD Commercial Bank	Gao Shan	Master's thesis of Jiangxi University of Finance and Economics	2020	x	x	x	x					
The current situation and improvement measures of internal audit quality management in rural commercial banks	Li Jiaxin	Modern Marketing	2020		x		x	x				
Current status and optimization measures of internal auditing in commercial banks	Luo Canyu	Financial Circles	2020		x		x		x	x		
Research on internal audit of rural commercial banks based on modern risk orientation	Shang Fanying	Administration Assets and Finance	2020		x		x	x				
Improving the quality and value analysis of internal auditing of commercial banks in the new era	Shang Fanying	Accounting Study	2020		x		x			x		
Analysis on the development path of internal audit of the People's Bank of China under the big data environment	Wang Jueyan	Financial Development Research	2020	x		x			x			
Thoughts on the transformation and upgrading of internal audit work in rural commercial banks under the new normal	You Xinhua	Small and Medium Enterprise Management and Technology	2020	x	x	x						
Current situation analysis and countermeasure research on performance audit of commercial banks	Cai Bingtan	Business Culture	2021	x			x					

Table A.1. Statistics of 64 documents (Part 2)

Title	*Author*	*Source*	*Year*	*COMP*	*IND*	*DI*	*IAQ*	*IAF*	*RI*	*ARR*	*AS*	*INN*
Some thoughts on strengthening the audit of commercial banks	Cui Lei	Administration Assets and Finance	2021	x	x	x						
A preliminary study and empirical analysis on the comprehensive rating management model of internal audit classification of rural commercial banks	Feng Jiangyin	China Internal Audit	2021	x					x			
Research on the selection of internal audit path of rural commercial banks	Li Lihua	National Circulation Economy	2021	x	x	x	x		x			
Analysis on strategies for internal audit work of commercial banks	Li Xiyan	Financial Circles	2021	x	x	x						
Research on the current situation and improvement measures of commercial bank audit rectification	Li Xinxia	China Township Enterprise Accounting	2021		x		x			x		
Research on the internal audit system of Postal Savings Bank	Li Xuanping	Modern Commerce	2021	x	x			x				
Internal audit empowers rural commercial banks to "control risks and promote development"	Liu Xuefen	Audit Observation	2021		x	x			x			
Research on the quality improvement management of FT Bank's internal audit work — based on the perspective of value-added auditing	Wang Xuefei	Master's thesis of Yunnan University	2021	x	x		x					
Problems and countermeasures faced by the internal audit work of my country's commercial banks	Xiao Lei	Fortune Today (China Intellectual Property)	2021	x	x	x						
Research on internal audit quality assessment of Minsheng Bank Luliang Branch	Yang Fan	Master's thesis of Lanzhou University of Technology	2021	x	x		x					
Research on the internal audit process improvement plan of B City Commercial Bank	Yang Mingjiao	Master's Thesis of Northwestern University	2021	x	x	x			x			
How financial institutions can strengthen internal audit quality control	Yang Yingzhuo	Public Investment Guide	2021	x	x	x				x		
Audit research on rural commercial banks in Jiangsu Province	Zhu Ruiran	Master's thesis of Yangzhou University	2021		x		x		x			x
Research on quality control of internal audit projects in commercial bank A	Ai Min	Master's thesis of Yunnan University	2022	x	x	x	x					
Research on Optimization Measures for Internal Audit Quality Control of Bank C	Guo Jun	Master's thesis of Hebei University of Technology	2022	x	x	x	x					
Thoughts on capacity building of internal audit teams of grassroots People's Banks under the new situation	Huang Lihua	Auditing and Financial Management	2022	x	x	x						
Research on internal audit quality issues of G Commercial Bank based on 5MxE analysis method	Li Xinyu	Master's thesis of Xijing University	2022	x	x	x	x					
Construction and application of strategic internal audit system — taking Internet banking as an example	Li Yunyi	Accounting Newsletter	2022	x	x		x					
Suggestions for doing a good job in internal audit of rural commercial banks	Liao Kexiang	Contemporary County Economy	2022	x	x		x					
Research on the internal audit of city commercial banks — taking Qingdao Bank as an example	Pan Chao	Master's Thesis of Qingdao University	2022	x	x			x		x		
Transformation of internal audit model in the digital era — taking China Construction Bank as an example	Tang Shuya	China Management Informatization	2022	x		x						
Discussion on the development and transformation of internal auditing in commercial banks	Wang Tao	Chinese Market	2022	x	x	x	x					
Internal audit transformation under the strategic transformation of rural commercial banks	Zhang Huiling	Today's Wealth	2022	x	x	x						
Research on the exploration and improvement of internal audit issues in G Bank	Chen Lan	Master's thesis of Nanjing University of Posts and Telecommunications	2023	x	x						x	
Research on internal audit quality control of Bank A	Gong Xiaohan	Master's thesis of Qingdao University of Science and Technology	2023	x	x	x			x	x		
Suggestions on promoting the application of bank internal audit results	Guo Jianguang	Master's thesis of Anhui University of Finance and Economics	2023				x			x		

Table A.1. Statistics of 64 documents (Part 3)

Title	*Author*	*Source*	*Year*	*COMP*	*IND*	*DI*	*IAQ*	*IAF*	*RI*	*ARR*	*AS*	*INN*
Explore the role of off-site auditing in bank internal auditing	Lin Xiaofeng	Financial Customer	2023	x								
Research on tracking and auditing the implementation of major national policies and measures — taking the internal audit of the People's Bank of China as an example	Liu Chuandong	China Internal Audit	2023	x	x		x				x	
Analysis of digital audit practices of commercial banks under the background of digital transformation	Liu Ting	Economist	2023	x		x	x					
Analysis and countermeasures on the current situation of digital transformation of internal audit of city commercial banks	Mo Guangzhou	Journal of Guangxi Vocational and Technical College	2023	x		x		x	x			
Research on internal audit issues of rural commercial banks in my country	Wang Dongsheng	Modern Marketing	2023	x		x	x	x				
Research on the construction of internal audit risk assessment system of commercial banks	Wang Qingsong	China Internal Audit	2023				x		x			
Research on internal audit quality control of Bank A	Wang Yulun	Master's thesis of Qingdao University of Science and Technology	2023	x			x					
Thoughts on the transformation and upgrading of internal audit work in rural commercial banks	Xv Sanli	Investment and Cooperation	2023	x	x							x
A preliminary study on the effectiveness of internal auditing in city commercial banks	Zhang Qiushui	Times Finance	2023		x		x					
Research on internal audit quality management of commercial banks — taking X commercial bank as an example	Zhou Junzhi	Accounting Study	2023	x		x	x	x				
Research on Internal Audit of Yibin Commercial Bank	Li Xiaoqing	Cooperative Economy and Technology	2024		x	x						
Research on risk-oriented internal audit application strategies of rural commercial banks	Tang Yanli	Enterprise Reform and Management	2024	x	x	x						
An analysis of the development and transformation of internal auditing in small and medium-sized banks	Zhan Dechao	Chief Accountant of China	2024	x	x	x					x	

Note: "x" indicates that this document involves the issue.