



**THE EFFECTS OF ORGANIZATION SIZE ON INTERNAL  
CONTROL AND INFORMATIZATION ON PRINCIPAL-AGENT  
RELATIONSHIPS AMONG CERTIFIED  
AUDITING FIRMS IN BEIJING**

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**A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy in Management  
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## Declaration

I, Liu Zhanwen (Student ID# 6319202002), hereby certify that the work embodied in this dissertation entitled “The Effects of Organization Size on Internal Control and Informatization on Principal-Agent Relationships Among Certified Auditing Firms in Beijing” is the result of original research and has not been submitted for a higher degree to any other university or institution.

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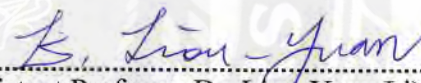
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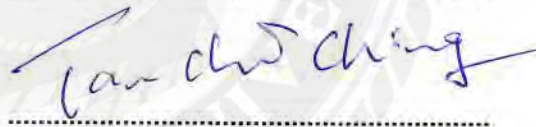
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## Abstract

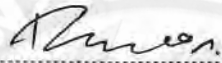
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This research focused on the impact of organizational size, internal control, auditor quality, informatization, and the principal-agent relationship on the audit quality of auditing firms. The study's objectives were: 1) to observe how the principal-agent relationship moderates the relationship between internal control and audit quality in certified auditing firms in Beijing; 2) to investigate the moderating effect of organizational size on the relationship between informatization, auditor quality, and internal control; and 3) to evaluate the effects of internal control, auditor quality, and informatization processes on audit quality in certified auditing firms in Beijing. The study utilized a random sampling method to select auditing firms registered in Beijing. Data were collected using an online tool, resulting in 534 valid questionnaires. The data were then analyzed using SPSS and AMOS. The analysis included descriptive statistics, structural equation modeling, and stratified regression.

The study's results are as follows: 1) The principal-agent relationship significantly moderates the relationship between internal control and audit quality; 2) Organizational size significantly moderates the relationship between informatization and internal control, as well as between auditor quality and internal control; 3) Internal control is a mediating factor between informatization, auditor quality, and audit quality, with both informatization and auditor quality positively influencing internal control and audit quality. Internal control had a positive impact on audit quality. Based on these results, the study recommends improving the management practices of audit firms in Beijing. The research also provides a reference for managers in the industry.

**Keywords:** organizational size, internal control, informatization, quality of auditors, audit quality, principal-agent relationship

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# Chapter 1

## Introduction

### 1.1 Background of the Study

In recent years, several well-known companies have drawn widespread attention due to accounting scandals, and the auditing firms providing services to these companies have consequently come under scrutiny. This has led information users to seriously question these firms' independence and audit quality. However, research on the specific functional role of the principal-agent relationship remains scarce in the context of auditing firm size, the modernization of informatization, and internal control mechanisms (Liu et al., 2019).

China officially implemented the new "Securities Law of the People's Republic of China" on March 1, 2020. Similar laws continue to emerge and mandate internal control auditing systems for the financialization of enterprises based on China's A-share listed companies (Chen & Chen, 2024). In addition, with the modernization of informatization, auditing firms are forced to invest and use it to improve their internal auditing systems (Liu et al., 2024). As a result, information users demand high-quality supervision services in a booming capital market economy, and the accounting and auditing industries demand upgrading technology-competent internal auditors to cope with business transactions' rich informativeness (Cheong & Zurbruegg, 2016). Furthermore, significant financial fraud cases have occurred frequently in recent years despite regulatory bodies' strict regulation and close monitoring (Nie et al., 2024).

As the "guardian" of the capital market, the credibility of the Chinese Certified Public Accountant Industry (CPAI) has been seriously questioned. In September 2020, the Ministry of Finance of China, the State-owned Assets Supervision and Administration Commission of the State Council, and the China Banking and Insurance Regulatory Commission jointly issued the document "Implementation Opinions on Strengthening the Practice Management of Auditing Firms to Improve Audit quality effectively," proposing to establish the regulatory principle of quality priority. Chinese scholars analyzed the penalties imposed on auditing firms and Certified Public Accountants (CPA) from 2001 to 2020 and believed that supervision is crucial to the management of auditing firms. Through statistics on the administrative penalties and administrative supervision of auditing firms engaged in

securities business by the Ministry of Finance and the China Securities Regulatory Commission from 2013 to 2022 (see **Table 1.1**), it can be concluded that the supervision of accounting affairs by relevant departments of the Chinese government has increased year by year. The development of auditing firms has had a significant impact. With the continuous development of the CPAI, some new professional ethics issues are constantly emerging, and there is an urgent need to make corresponding regulations in the professional ethics code. The audit quality of auditing firms has become a focal point in the capital market and a key area of government oversight.

**Table 1.1** Administrative Penalties and Regulatory

Year	Administrative Penalties (time)	Administrative Regulatory measures(time)	Total (time)
2013	2	1	3
2014	6	3	9
2015	1	7	8
2016	5	62	67
2017	8	52	60
2018	6	108	114
2019	5	62	67
2020	19	317	336
2021	33	278	311
2022	20	108	128

Note. Scope of statistics: Auditing firms engaged in securities business in China.  
Data source: China Securities Regulatory Commission, compiled by the researcher.

Auditing firms are professional institutions that provide accounting, auditing, consulting, and other services. Their internal control, informatization, and the quality of their auditors are crucial for ensuring service quality, protecting client interests, and maintaining the industry's reputation. In recent years, the demands for financial reporting have become increasingly stringent. Auditing firms face growing pressures and challenges with informatization's rapid development. Studying auditing firms' internal control, informatization, and audit quality has become a significant research focus in this context.

Whether the scale development of auditing firms and the quality of audit services provided can meet the needs of China's enterprise development has become an important task



and an inevitable choice. Achieving coordinated development between scale and audit quality while improving overall competitiveness has become an essential objective. Audit quality is a key factor in determining the success of auditing firms. High-quality audits are crucial in helping auditing firms maintain their core competitiveness and solid reputation. They also contribute to the advancement of social and economic development and the progress of the entire industry. However, in recent years, audit failures have occurred frequently, such as the Enron scandal in the United States, the Luckin Coffee incident involving a Chinese company listed in the U.S. (No. LKNCY), and the financial fraud cases of China's Kangdexin (KDX No. SZ002450) and Zhangzidao (No. SZ002069). These incidents have severely harmed financial report users' interests and made auditing firms victims of financial fraud, leading to widespread doubts about the principal-agent relationship model. According to statistics, in 2020, 76.67% of the 30 typical listed companies punished by the China Securities Regulatory Commission (CSRC) for financial fraud were still issued standard unqualified opinions by certified public accountants in the year of the fraud (Chen et al., 2024). This ongoing audit expectations gap is difficult to bridge. The above phenomena reflect that some auditing firms blindly pursue the quantity of audit business and expand their scale, neglecting audit quality control. In reality, amidst fierce market competition, many defects persist in the audit quality control of auditing firms, and audit failures are primarily attributed to these deficiencies. Chen et al. (2024) argue that if auditing firms fail to establish a high-quality internal control system and ensure its effective implementation, they may eventually issue inappropriate audit opinions, leading to audit failure and seriously misleading information to users and investors. This can even result in significant economic losses. Moreover, Hang et al. (2015) suggest that talent development and quality improvement should be regarded as top priorities in the construction of the CPAI, with efforts made to enhance the credibility and influence of the industry's development. Therefore, by studying the relationship between the scale of auditing firms and their internal control, informatization, and audit quality, we can better understand the management characteristics of the firm and the importance of various processes, providing a scientific basis for management decisions. This research will also help improve auditing firms' service quality and efficiency, protect client interests, and maintain industry reputation.

When enterprises choose auditing firms, the quality of audit quality control has emerged as a crucial indicator for measuring auditing firms' core strength and

competitiveness. As professional institutions providing accounting, auditing, taxation, and other services, the internal control and informatization construction of auditing firms is of great importance in ensuring service quality, protecting client interests, and maintaining industry reputation (Li, 2014). In practice, accounting firms' organizational size profoundly influences their internal control and informatization management. Organizational size directly impacts the implementation of internal control; large auditing firms typically possess more comprehensive organizational structures and management systems, enabling them to have adequate internal control (Williams, 1993). Moreover, organizational size significantly influences the implementation of information management; large auditing firms tend to have more resources and technical capabilities, allowing them to invest more excellent human, material, and financial resources in developing and implementing information systems (Lan, 2021). These firms typically adopt advanced information technologies, such as automated auditing tools and cloud computing, to enhance work efficiency and service quality and establish robust information security management systems to ensure the confidentiality and security of client information (Peng, 2006). This study integrates practical and theoretical backgrounds, focusing on auditing firms in Beijing, exploring the impact of organizational size, internal control, auditor quality, institutional development, and other factors on audit quality in Beijing's auditing firms. Furthermore, it offers targeted suggestions to improve audit quality control and core competitiveness among auditing firms in Beijing and provides valuable references for auditing firms in other regions.

## **1.2 Significance of Study**

This study, rooted in economies of scale, principal-agency theory, and systems management theory, has significant theoretical and practical implications for auditing. Using these integrated theories leads to a conceptual model that fills a vital literature void between auditor quality, informatization, and audit quality. While information technology modernization is significant in uplifting the performance of auditing clients (Liu et al., 2024), it is still a tremendous challenge for auditing firms in their practices of corporate governance and internal control systems when client firms become more complex and more extensive (Li et al., 2024). As noted by Liu et al. (2024) and Li et al. (2024), the complex dynamics of auditing firms involving the use of informatization and internal control systems are still relatively unresolved, and this complexity is amplified further when either client size and the

auditing firm's size becomes more significant. To this end, this study offers integrating theories to explain how a firm's size and principal-agency relationships can be treated as vital moderators that can systematically be employed to leverage the functions of both informatization and auditor quality so that audit quality can be improved to meet requirements.

The following further states the significance of each application of the theories.

First, the significance of economies of scale theory is particularly evident in auditing firms. As firms grow, they achieve operational efficiencies that allow them to spread fixed costs over a more extensive base, thereby reducing the per-unit cost associated with internal controls and compliance (Shleifer & Vishny, 1997). This concept is especially relevant in larger firms, which can leverage their size to invest in advanced technologies and robust internal control systems. China's audit firms are also developing rapidly, and many audit firms are becoming larger and more powerful. According to the data analysis of 100 audit firms published by the Chinese Institute of Certified Public Accountants (CICPA), in 2022, there were 15 audit firms with operating income exceeding 1 billion yuan, with the minimum number of branches being 11 and the maximum being 43. These investments lead to enhanced audit quality and improved operational resilience, aligning with the broader economic theory that larger organizations can achieve cost advantages and operational synergies. The empirical data in **Table 1.2** and **Table 1.3** supports this theory, showing how larger firms utilize their scale to implement sophisticated systems that enhance efficiency and audit quality.

**Table 1.2** Income Distribution of Top 100 Auditing Firms From 2018 to 2022

Group (million)	2022	2021	2020	2019	2018
<10	0	0	0	1	1
10-100	49	47	49	49	50
100-1000	36	38	36	35	34
1000-3000	6	9	10	10	10
≥3000	9	6	5	5	5
Total	100	100	100	100	100

Note: The data comes from the CICPA net and is compiled by the author.

**Table 1.3** Branch Distribution of Top 100 Auditing Firms From 2018 to 2022

Group	2022	2021	2020	2019	2018
0	28	27	27	27	25
1-10	34	34	36	37	40
10-20	14	20	20	20	20
20-30	15	14	13	12	12
≥30	9	5	4	4	3
Total	100	100	100	100	100

Note: The data comes from the CICPA net and is compiled by the author.

Second, the principal-agent theory aims to understand and resolve the complex dynamics between auditing firms and their clients, especially as firms expand in size and complexity. Principal-agency theory emphasizes the potential conflicts of interest that arise when auditors, acting as agents, provide objective assessments of their client's financial statements (Cheng, 2004). Larger firms, with their extensive client bases and more intricate organizational structures, are particularly vulnerable to these conflicts. The study suggests that by adopting robust governance frameworks and internal controls, larger firms can mitigate these risks, thereby maintaining auditor independence and enhancing the credibility of audit outcomes. Understanding how organizational size influences the integrity and reliability of audits is essential for sustaining stakeholder trust and confidence in financial reporting.

Third, systems management theory also plays a crucial role in this research. As auditing firms expand, their operations become more complex and require more sophisticated and adaptable internal control systems. The study emphasizes that larger firms must continuously refine these systems to maintain operational consistency and compliance across all levels of the organization (Libby & Frederick, 1990). This theoretical perspective is particularly relevant in modern auditing, where firms must navigate a complex web of regulatory requirements, technological advancements, and market dynamics. The research underscores the importance of robust internal control systems in managing these complexities, ensuring that larger firms can maintain high audit quality standards and operational efficiency.

From a practical standpoint, this study provides auditing firms with valuable insights into improving internal control systems, optimizing informatization investments, and

innovating management practices. The research helps managers identify weaknesses within their internal controls and implement measures to streamline these processes, making them more effective and efficient. This, in turn, leads to better overall management within auditing firms, ensuring that operations are conducted with greater accuracy, reliability, and compliance. The data on branch distribution and income levels among the top 100 auditing firms, as shown in **Table 1.2** and **Table 1.3**, highlight the varying approaches firms take based on their size, illustrating the importance of strategic decision-making in maintaining competitiveness and ensuring high audit quality.

Besides the theoretical significance, informatization management is another area in which this research makes significant contributions. As information technology becomes increasingly central to auditing processes, firms must carefully consider their investments in informatization relative to their organizational size (Liu et al., 2024). The study offers valuable references for firms deciding how much to invest in information technology and which technologies will yield the best returns. With their more significant resources, larger firms can more readily adopt advanced technologies such as AI, blockchain, and cloud computing, which enhance audit quality and operational efficiency. However, the research also emphasizes that smaller firms can achieve similar benefits by strategically focusing on scalable, cost-effective solutions that align with their specific operational needs. The data in **Table 1.3** further illustrates the range of financial capabilities among auditing firms, highlighting the importance of making informed decisions about informatization investments.

Additionally, the practical implications extend beyond the internal operations of auditing firms. This study's findings are relevant to regulatory bodies and policymakers who aim to enhance the overall quality and reliability of financial reporting in the market. By understanding how organizational size influences audit quality, regulators can develop more targeted guidelines and policies that promote transparency and protect investors. This study also provides valuable insights for investors and stakeholders, helping them assess the quality of audits based on the size and internal controls of auditing firms.

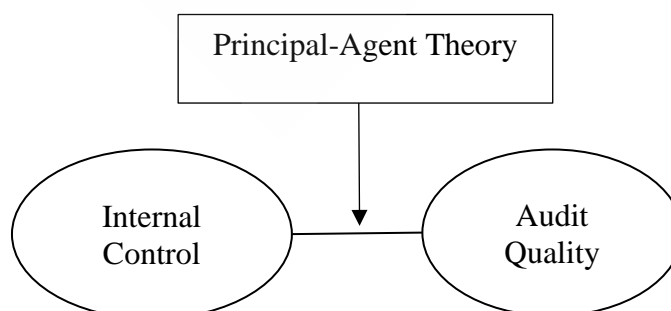
Lastly, this study's broader social and academic significance cannot be overlooked. Academically, it advances the understanding of how organizational size impacts key operational dimensions within auditing firms, adding to the existing knowledge in accounting and auditing. Socially and organizationally, the research emphasizes the critical role of high-

quality audits in maintaining public trust and confidence in financial reporting. By ensuring that auditing firms operate with high levels of integrity and efficiency, the study supports the stability and transparency of financial markets, which is vital for economic growth and development.

### 1.3 Research Questions

Three theories, namely, the principal-agent principle, the systems management theory, and the economies of size theory, provide the intellectual bases for raising the research questions.

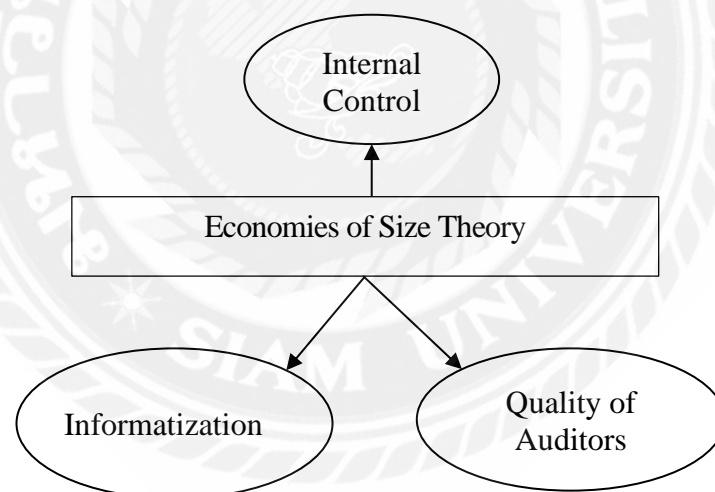
The theoretical supports for each question are given in **Figure 1.1** and explained as follows. First, principal-agent theory provides a valuable framework for understanding the moderating role of the principal-agent relationship in the interaction between internal control and audit quality, as shown in **Figure 1.1**. Within this theory, the relationships among auditing firms, clients, and regulatory agencies are inherently characterized by principal-agent dynamics. To fulfill their responsibilities effectively, auditing firms must prioritize the quality and integrity of their services, aligning their actions to maximize client interests. Additionally, the organizational size of auditing firms is intricately connected to the complexity of their internal control and informatization management. As auditing firms expand, the challenges related to internal control become more pronounced. Thus, developing a robust internal control mechanism that effectively addresses the complexities of organizational structure, business processes, and personnel management is essential, ensuring that audit quality and client interests are safeguarded.



**Figure 1.1** The Mode of the Principal-Agent Relationship

(Source: Researcher, 2023)

Second, as the scale of auditing firms expands, they face increasing competitive pressure. It is crucial to consider how to leverage economies of scale, including divisions of labor, specialization, and standardization, to improve efficiency and reduce costs. Additionally, as the size of auditing firms grows, the complexity of their internal control and informatization management increases. Therefore, it is essential to establish a comprehensive system control mechanism that encompasses robust internal control systems and advanced informatization to enhance audit quality. Furthermore, attention must be given to maintaining the balance between expanding scale and maintaining high audit standards, ensuring that growth does not compromise the quality of auditors. This consideration includes continuous investment in technology and ongoing training for auditors to adapt to the evolving complexities of larger organizations. Thus, the theory of economic size offers a theoretical base for studying how the organizational size of auditing firms leverages the functions of informatization and the quality of auditors in strengthening internal control capability in the auditing system and practices (see **Figure 1.2**).



**Figure 1.2** The Mode of Economies of Scale Relationship  
(Source: Researcher, 2023)

Third, from the perspective of system management theory, as auditing firms expand in scale, they inevitably face more significant risks and increased complexity in their internal controls. This raises critical questions about effectively assessing audit risks, establishing robust internal control mechanisms, and implementing appropriate information technology measures. Moreover, as the complexity of operations grows, it becomes increasingly important to strengthen personnel training and management. Continuous professional

development and adopting advanced technologies are essential to ensure that internal controls remain effective and responsive to evolving challenges. Additionally, firms must consider integrating these controls seamlessly into their organizational structure, ensuring that efficiency and audit quality are maintained as the firm scales.

Given the background, the significance of the study, and the three theoretical backgrounds as narrated above, three research questions were raised in this study:

(1) Does the principal-agent relationship moderate the relationship between internal control and audit quality?

(2) Does organizational size moderate the relationship between informatization, the quality of auditors, and internal control?

(3) Does internal control significantly mediate the impact of the quality of auditors and informatization on audit quality in auditing firms?

#### **1.4 Research Objectives**

The primary goals of this research on internal control and informatization management within auditing firms are to ensure the accuracy, effectiveness, and security of audit processes, reduce audit risks, enhance work efficiency and precision, and strengthen personnel training and management. This ensures all staff comply with internal control and information technology policies, minimizing potential errors and fraud. Given the increasing complexity of auditing environments, driven by technological advancements and regulatory requirements, it becomes crucial for auditing firms to adapt by integrating robust internal controls and effective informatization strategies. This study aims to contribute to the existing literature in understanding these dynamics by integrating the principal-agent relationship, systems management theory, and the organizational size. The integrative theoretical framework will use the organization size of auditing firms and the principal-agent relationship as the two significant moderators to bring about the quality results of quality of auditors, informatization, and internal control in achieving audit quality. The research specifically focuses on understanding these dynamics to address the following objectives:

(1) To observe how the principal-agent relationship moderates the relationship between internal control and audit quality in certified auditing firms in Beijing.



(2) To investigate the moderating effect of organizational size on the relationship between informatization, auditor quality, and internal control.

(3) To evaluate the effects of internal control, auditor quality, and informatization processes on audit quality in certified auditing firms in Beijing.

### 1.5 Research Scope

The research scopes involve the subjects of the study, the method, and the approach to data collection.

The subject of this study is to audit firms registered in Beijing. Auditing firms outside Beijing are excluded from this study. An analysis of the regional distribution of the top 100 auditing firms in China from 2018 to 2022 found that among the top 100 auditing firms in China, auditing firms in Beijing accounted for an average of 34.4% in the past five years (see **Table 1.4**). From an operating income perspective, registered auditing firms in Beijing account for an average of 53.6% in the past five years (see **Table 1.5**). Based on the significant weight of the number of registered auditing firms and their revenues, auditing firms in Beijing are selected as the research subjects. Beijing's auditing firms, to a large extent, represent the general trend of auditing practices, trendy investment of informatization, quality choices of auditors, and strict establishment of auditing systems and structures in delivering auditing requirements to clients in China.

**Table 1.4** Distribution of the Top 100 Auditing Firms From 2018 to 2022

Year	Beijing	Ratio%	Other Provinces	Ratio%	Total
2022	33	33	67	67	100
2021	33	33	67	67	100
2020	32	32	68	68	100
2019	35	35	65	65	100
2018	39	39	61	61	100
Average	34.4	34.4	65.6	65.6	100

Note: The data comes from the CICPA net and is compiled by the researcher.

**Table 1. 5** Income Distribution of the Top 100 Auditing Firms From 2018 to 2022

Year	Beijing	Ratio%	Other Provinces	Ratio%	Total
2022	385.96	53	344.43	47	730.39
2021	350.63	53	311.22	47	661.86
2020	304.60	52	281.44	48	586.03
2019	268.65	51	255.14	49	523.79
2018	299.29	59	206.34	41	505.63
Average	321.83	53.60	279.71	46.40	601.54

Note: The data comes from the CICPA net and is compiled by the researcher.

Methodologically, the study is limited to quantitative surveys. The study uses a quantitative method, which involves surveying the perceptions and opinions of the principal certified auditors in Beijing regarding auditing firms' size and principal-agent relationships in the interplaying dynamics between audit quality, informatization, internal control, and audit quality. By limiting to quantitative surveys, this study needs to review the literature carefully and suggest theoretical gaps to fill the existing bodies of knowledge in the auditing discipline. Nevertheless, in doing so, the study excludes considering any context-specific situations and issues that may arise if subjected to rich, in-depth interviews.

In terms of data collection, this study broadly considers small, medium-sized, and large auditing firms, involving 40 registered auditing firms in Beijing, so that a broad perception coverage can better reflect the diversity of firm size effect and the nature of principal-agent in examining the relationship dynamics linking informatization and audit quality mediated with an internal control to impact audit quality.

## 1.6 Research Methods

Given the theory-testing nature of this study, the quantitative method becomes the primary means for data collection and analysis. The quantitative method underpins an objectivistic epistemology that aims to maintain a value-neutral stance in data collection, and the statistical means provide the avenue for explaining the conceptual model's logical hypotheses (Yilmaz, 2013).

The methodological procedures are outlined as follows: First, the study adapts and re-constructs the questionnaire items of the constructs based on existing scales and the guidance of the three theories in the auditing context. The measurement scales underwent a rigorous item-objective congruence assessment by seeking the consensus and opinions of the experts. The process of expert opinions provided suggestions for improving wordings and deleted those items that did not match the meaning of the constructs well. In addition, the study follows a strict ethical protocol. The sample targeted the certified auditing firms in Beijing, which has been discussed in the “research scope” section to have a reasonable degree of representativeness of the auditing firms in China, at least in terms of the general trend of auditing practices, investment of informatization, quality choices of auditors, and the robust establishment of auditing systems and structures.

Upon determining the relevant variables, this study adopts a quantitative research method. The quantitative approach involves systematically collecting, analyzing, and statistically evaluating sample data to elucidate the relationships among variables and to explain and predict observed phenomena. Data will be collected online through a rigorously designed questionnaire targeting employees of selected auditing firms. The questionnaire will gather essential information on organizational size, internal control systems, informatization management levels, principal-agent relationships, and audit quality.

Following data collection, statistical analysis was employed to investigate the impact of organizational size on internal control, informatization, and auditor quality. To model and test the relationships between these variables, this study employs structural equation modeling (SEM), which allows for the simultaneous analysis of multiple relationships of the variables. SEM is instrumental in constructing theoretical models and testing hypotheses. A systematic guideline for SEM is given by Fornell and Larcker (1981), which includes incremental and absolute model fits and measures to deliver reliable SEM tests. Statistical software packages such as SPSS and AMOS are utilized to perform the analyses, ensuring rigorous examination of the data. The study validates each hypothesized relationship using SEM and correlation analyses, ultimately leading to well-substantiated research conclusions.

## 1.7 Expected Results

This study aims to comprehensively explore the factors influencing audit quality within certified auditing firms in Beijing, focusing on the relationships among internal control, informatization, quality of auditor, organization size, and the principal-agent relationships. The expected results are structured to align closely with the research objectives, as outlined below:

### 1) Moderating Role of the Principal-Agent Relationship

In line with the first research objective, which seeks to examine how the principal-agent relationship moderates the relationship between internal control and audit quality, a well-managed principal-agent relationship is expected to significantly enhance the positive impact of internal controls on audit quality. Firms with a robust principal-agent relationship will likely experience better communication, higher levels of trust, and more transparent accountability, leading to more effective internal controls and improved audit outcomes. As noted, for instance, in Ding et al. (2024) and Cobo-Reyes et al. (2017), a transparent principal-agent relationship builds a strong base of trust between the principal and the agent and motivate social network learning to improve the agent's output efficiency and significantly able to meet the expectation of the firms of the principal.

### 2) Impact of Organization Size on Informatization, Quality of Auditor, and Internal Control

Reflecting the second research objective, which investigates the moderating effect of organizational size on the relationship between informatization, quality of auditor, and internal control, the study is expected to reveal that larger firms benefit from more advanced levels of informatization, higher auditor quality, and more robust internal controls. These factors are anticipated to interact in ways that significantly enhance audit quality. In contrast, smaller and medium-sized firms may face challenges due to their limited resources and less sophisticated systems. However, they can still achieve high audit quality through strategic investments in critical areas. The study expects to offer critical size-based practical and theoretical implications, as the research of auditing firm size on auditing quality is rare. Research shows that auditing firm size is significant to audit practices, such as intervening in the interests of shareholders' entrenchment and managerial ownership in the auditing process

(Shan et al., 2019). This study contributes to the literature by examining how auditing firm size moderates the relationships between informatization, auditor quality, and internal control.

### 3) Effects of Internal Control, Quality of Auditors, and Informatization on Audit Quality

Consistent with the third research objective, which aims to evaluate the effects of internal control, auditor quality, and informatization on audit quality, the study is expected to demonstrate that these factors have a substantial and direct positive impact on audit quality. Moreover, these elements are anticipated to interact synergistically, meaning that improvements in one area, such as informatization, will enhance the effectiveness of internal controls and auditor performance, further boosting audit quality. Although information technology has been examined to contribute to alleviating the general risks faced in the auditing processes (Liu et al., 2024) and how auditor quality should act transparently (Bryan, 2017), including the role of internal control in general auditing performances (Bryan, 2017), their combined influence in the quality of auditing firms is relatively unfound. As a result, this study expects that addressing the third research objective will generate significantly critical implications, both theoretically and practically.

### 4) Practical Implications for Auditing Firms

The findings are expected to provide actionable insights for auditing firms, particularly in Beijing, on improving audit quality based on their organizational size and the state of their principal-agent relationships. Larger firms may focus on leveraging their strengths, while smaller firms could prioritize targeted enhancements in internal controls, auditor training, and informatization to overcome resource limitations.

### 5) Contribution to Academic Knowledge and Industry Practice

This research is expected to contribute valuable knowledge to the academic field by providing empirical evidence on how organizational dynamics, such as size and the principal-agent relationship, influence audit quality. Additionally, the study will offer practical guidelines for auditing firms, aiding them in refining their audit quality management practices in line with their unique organizational characteristics. This could lead to industry-wide improvements in audit reliability and credibility.

## **1.8 Research Contribution**

It is of great significance to understand the relationship between the principal-agent relationship of auditing firms and audit quality. A literature review reveals few studies on the principal-agent relationship and audit quality of auditing firms in China. This study analyzes and verifies the relationship between the principal-agent relationship and audit quality, providing a reference for related research.

It has a promoting effect on improving the credibility of the CPAI. This study reveals the impact mechanism of the size of auditing firms on audit quality. It proposes solutions for auditing firms in resource allocation, internal control improvement, informatization investment, auditor quality training, and audit quality enhancement. These efforts will help maintain the industry's image and thereby improve the credibility of the CPAI.

It has significant reference value for the policy formulation of regulatory agencies. The results of this study can guide regulatory agencies in formulating policies related to the scale of auditing firms, internal control, informatization, and auditor quality, thereby helping to improve regulatory efficiency and safeguard public interests.

It has expanded significance for academic research. This study is an innovative investigation into the moderating effect of organizational size on audit quality through the principal-agent relationship, expanding the research perspective on factors affecting audit quality.

It compensates for the lack of research cases. Many scholars have studied auditing firms in China, examining their relationship with audit quality from various aspects such as internal control, audit technology, audit fees, principal-agent relationship, regional differences, human resources, organizational form, and employee satisfaction. However, in recent years, fewer than 50 research papers on organizational size and audit quality have been retrieved from the China National Knowledge Infrastructure (<https://www.cnki.net>). This study helps to address the lack of relevant literature on organizational size and audit quality.

## **1.9 Definition of Key Terms**

This section provides the definitions of the terms that are constructs of the study, including an explanation of auditing firms, which pervades the entire thesis as the subject of

the study. The definitions of key terms are presented in **Table 6**.

**Table 1.6** Definition of Key Terms

Term	Definition
Organization Size	The organization size of an auditing firm refers to a comprehensive consideration of factors such as the number of employees, the number of branches, and the annual operating revenue. The number of employees encompasses CPAs, audit assistants, and managers. The number of branches reflects auditing firms' scope of business coverage in different regions, and the annual operating revenue represents the economic scale. These indicators collectively form the basis for measuring the organizational size of auditing firms, providing specific and quantifiable reference standards for various research and analyses.
Internal Control	Internal control within an auditing firm refers to a set of policies, procedures, and practices established to ensure the integrity and reliability of audit reporting, compliance with laws and regulations, and the effectiveness and efficiency of the firm's operations. Internal control in an auditing firm is critical to maintaining the quality and credibility of the firm's audit and assurance services, and it involves the collaboration of all levels of personnel within the firm to enforce and uphold these controls. Involving enterprise risk management (ERM) Internal control elements: control environment (governance and management), risk assessment, control activities, information and communication (professional ethics and business acceptance), and monitoring and improvement.
Informatization	Informatization in the context of auditing firms refers to the comprehensive process of integrating information technology into all aspects of the firm's operations, including the development of information management platforms, training of IT personnel, managing information risks, and establishing robust information infrastructure such as data sharing, network security, and software systems. This process aims to enhance the efficiency and accuracy of accounting and auditing services, reduce operational costs, improve reporting quality, and support the firm's strategic growth by adopting advanced technologies such as cloud computing, big data, artificial intelligence, and blockchain.

Term	Definition
Audit Quality	Audit quality refers to the extent to which an audit meets the necessary professional standards and provides accurate, reliable, and unbiased financial information. When viewed as a product, audit quality is reflected in the accuracy of audit reports, the correctness of the selected opinion types, and the information's reliability. When viewed as a service, audit quality encompasses the integrity and thoroughness of the audit process, the auditor's ability to detect and report misstatements or omissions, and the assurance and credibility the audit provides to stakeholders.
Principal-Agent Relationship	The principal-agent relationship in auditing refers to the dynamic in which the principal (such as shareholders, government regulators, or information users) relies on the agent (such as auditors) to act on their behalf, particularly in ensuring the accuracy and completeness of financial reporting. The agent is entrusted with this responsibility due to their professional expertise and independence. To maintain the objectivity and reliability of the audit, the agent must uphold their independence and ensure that their work remains free from influence or pressure from the principal.
Auditing Firm	An auditing firm is a company or partnership established after 1981 in accordance with Chinese law. It is a professional service that operates as a company or partnership and provides a range of services, including auditing, accounting, consulting, and other related services.



## **Chapter 2**

### **Literature Review**

This chapter is separated into four parts as follows:

2.1 Introduction

2.2 Literature Reviews

2.3 Conceptual Framework

2.4 Conclusion

#### **2.1 Introduction**

The relationship between organizational size and audit quality has been a central academic research theme since the 1980s. Studies have shown that larger accounting firms, due to their better-developed internal control systems and advanced informatization infrastructure, generally provide higher-quality audit services than smaller firms (Muliawan & Sujana, 2017; Okoye et al., 2022). Internal control plays a crucial role in the audit process, as robust internal controls help prevent errors and fraud, improving audit quality. Studies by Febriyanti and Mertha (2014) and Ali and Aulia (2015) suggest that there may be a negative correlation between organizational size and audit quality, indicating that larger firms do not always guarantee better audit results. On the contrary, other studies, such as those by Abbott and Parker (2000) have found no significant relationship between these two variables.

Informatization, another critical variable in modern auditing, refers to the degree of integration of advanced technologies such as data analytics, cloud computing, and artificial intelligence (AI) into auditing processes. Research suggests that firms with higher levels of informatization achieve more outstanding audit quality because these technologies enhance the accuracy, efficiency, and reliability of audits (Wang, 2021). Informatization is particularly significant in large firms, which often have the resources to invest in cutting-edge technology to support their auditing functions. Conversely, smaller firms may struggle to achieve the same level of informatization, which could lead to a gap in audit quality between firms of different sizes.

The quality of auditors also significantly influences audit quality. Auditor quality encompasses various factors, including expertise, ethical standards, and professional judgment (Li et al., 2023). Larger accounting firms often have more rigorous training and selection processes, which can lead to better-qualified auditors. However, the increasing complexity of audits due to technological advances, such as informatization, requires that even small firms maintain high auditor quality to keep up with industry demands.

The principal-agent relationship, another critical factor, influences auditors' approach. Auditors act as intermediaries between company management (the agent) and shareholders (the principal), whose interests may sometimes conflict. Coffee (2019) argues that clients may prefer deferential audits, which can compromise audit quality. This dynamic reflects the potential for principal-agent issues to influence the integrity and independence of audits. Zhang and Li (2020) found that external supervision by bodies such as the CICPA can mitigate some of these concerns by strengthening internal controls and promoting more rigorous audit standards. However, Wu and Chen (2018) observed that in regions with weaker legal environments, larger clients who purchase substantial non-audit services from their auditing firms often experience lower audit quality, suggesting that the principal-agent relationship can be influenced by external factors such as the regulatory environment.

In sum, the relationship between organizational size and audit quality cannot be viewed in isolation but must be understood through the interplay of internal control, informatization, auditor quality, and the principal-agent relationship. Studying the dynamics of these six variables is essential, especially in the context of auditing firms in Beijing. By examining how these variables interact, particularly how organizational size and informatization affect internal control and how the quality of auditors mediates audit quality, we can better understand how to improve audit practices. Additionally, it is crucial to explore how principal-agent dynamics influence audit quality in various regulatory environments. This research contributes to a deeper understanding of how audit quality can be enhanced through better internal controls, auditor training, and informatization efforts, all while addressing the complexities of principal-agent relationships.

## 2.2 Organization Size

### 2.2.1 Economic Size Theory

The theory of economies size originates from the work of Adam Smith and David Ricardo, explaining how businesses reduce average costs through expanding production, resource sharing, and specialization. However, the theory also recognizes diminishing returns to scale, where excessive growth increases marginal costs due to management complexity. During the 20th century, economists like Ronald Coase (1937) introduced transaction cost theory, and Stigler (1961) emphasized information asymmetry as a factor influencing scale efficiency. In recent years, modern scholars have expanded the theory. Clayton Christensen introduced disruptive innovation, focusing on the role of technology and innovation in maintaining competitive advantage, especially in a globalized market. Erik Brynjolfsson and Andrew McAfee explored the impact of the digital economy, noting that big data and AI further reduce marginal costs through economies of scale. Dani Rodrik analyzed the effect of global integration, particularly for developing countries, discussing the challenges and opportunities presented by global supply chain integration.

**Table 2.1** Development of Economies Size Theory

Scholar	Year	Main Contribution
Adam Smith, David Ricardo	1700s	Proposed that expanding production reduces costs, introducing the concept of economies of scale.
Ronald Coase	1937	Introduced transaction cost theory, emphasizing that firm size must consider transaction costs.
George Stigler	1961	Developed information asymmetry theory, highlighting how information gaps affect economies of scale.
Robert Lucas	1980s	Emphasized the role of human capital accumulation in firm growth and economies of scale.
Paul Krugman, Joseph Stiglitz	2000s	Highlighted the relationship between technological innovation, globalization, and economies of scale.
Jean Tirole	2010s	Studied the interaction between economies of scale, industry regulation, and monopolies.

Scholar	Year	Main Contribution
Eric Maskin	2020s	Explored the impact of economies of scale on market barriers and inequality in developing nations.
Clayton Christensen, Erik Brynjolfsson, Andrew McAfee	2020s	Emphasized disruptive innovation and the digital economy's impact on economies of scale.
Dani Rodrik	2020s	Investigated the role of global supply chains in economies of scale, particularly in developing nations.

Note: Collected and organized by the researcher.

By incorporating modern scholars' perspectives, the theory of economies of scale has expanded to include technological advancement, globalization, and innovation, further enhancing its applicability in emerging economic environments. In the auditing industry, the theory is equally relevant, as firm growth improves resource allocation, the introduction of information technologies, management process optimization, talent recruitment, and stricter internal controls, which lead to higher audit quality. This ensures compliance with professional standards while enhancing industry recognition and competitiveness.

### 2.2.2 Concept of Organization Size

The concept of organizational size is a significant topic in organizational studies and management, with its origins traced back to early organizational theory and management thought. Although early researchers did not explicitly propose the concept of organizational size, they examined the impact of size on behavior and performance. In *The Principles of Scientific Management*, Frederick Winslow Taylor emphasized size's influence on management and production efficiency, arguing that larger organizations benefit from division of labor and specialization, resulting in higher efficiency (Taylor, 1911). By the 1950s and 1960s, researchers focused more on organizational size and its factors, primarily investigating its relationship with organizational efficiency, structure, and culture. Danos and Eichenseher (1982) found that changes in market share could indicate economies of scale in certain firms. Xia and Lin (2003) suggested that audit fees relative to assets decrease as client asset sizes increase, supporting the idea of economies of scale in auditing. This theory posits that as production scales up, certain factors of input increase disproportionately, leading to

greater efficiency.

Research shows that smaller firms tend to have higher production and cost efficiency, while larger firms perform better in innovation (Damanpour, 1992; Kimberly, 1976; and Wang et al.,2017). In terms of organizational structure, larger organizations tend to have more complex structures with increased management layers (Gooding & Wagner III, 1985), while smaller firms emphasize flexibility and innovation (Damanpour & Schneider, 2006; and Wang et al.,2017). Regarding organizational culture, larger firms often adopt more formalized and standardized management approaches, whereas smaller organizations prioritize adaptability and innovation. Moreover, studies show that larger organizations have lower employee participation due to more complex structures and clearer functional divisions, and employee satisfaction tends to be lower in larger organizations because of more specialized and mechanical work tasks (Tansel & Gazioglu, 2014). Larger organizations also exhibit higher employee turnover rates due to intensified internal competition and fewer promotion opportunities (Yang, 2023).

The relationship between organizational size and performance has been a key focus of management research, with studies indicating mixed outcomes. While some research suggests that increased organizational size can reduce operational efficiency and negatively impact performance (Liang & Bai, 2021), others argue that larger organizations enjoy economies of scale, improving economic performance (Wang et al., 2020). One of the main challenges in organizational size research is determining how to maintain or improve performance as size increases while managing the complexities that arise with growth. Larger organizations tend to have more complex management structures, decision-making processes, and communication channels, increasing management costs and risks (Mouritsen, 2001; Li, 2022). At the same time, communication and knowledge sharing can become more complex, potentially hindering innovation. However, smaller organizations with more streamlined communication processes often encourage greater innovation (Kolvereid & Åmo, 2021). Conversely, larger organizations may compensate for communication challenges by increasing innovation investment and R&D efficiency (Damanpour & Schneider, 2006 and Wang et al.,2017).

In conclusion, the size of an organization influences various aspects, including internal control, employee satisfaction, informatization, risk management, performance,

and innovation. Larger organizations often face challenges in maintaining efficient communication and controlling management costs, but they may benefit from economies of scale and increased innovation capacity. On the other hand, smaller organizations may excel in flexibility, employee engagement, and fostering creativity, though they may struggle with scaling up performance as effectively as larger firms. Thus, understanding how organizational size affects performance and innovation is crucial for optimizing structure and management processes in growing organizations.

### **2.2.3 Connotation of the Size of Auditing Firm**

The study primarily focuses on exploring the relationship between the organizational size of accounting firms and various factors such as service quality, economic performance, market share, and human resource management. According to Liu (2008), larger accounting firms typically have a broader range of services, allowing them to undertake more complex projects and provide more comprehensive services to meet client needs. Additionally, larger firms often leverage their extensive resources and networks to expand their service offerings and improve service quality. Larger firms generally employ more professionals, allowing them to deliver more specialized services and meet client demands. They also benefit from economies of scale, improving efficiency, and broadening service offerings. Larger firms can often serve clients over a wider geographic area, expanding their client base and increasing brand visibility. Furthermore, they utilize better-developed networks and resources to enhance service quality across different regions (Gul, 1991; Meng, 2020). Larger firms also tend to generate higher revenues, enabling them to handle more complex projects. Moreover, they benefit from more refined management systems and resources, which help improve service quality and expand their client base, further increasing revenue (Ashbaugh & Warfield, 2003).

The size of auditing firms is closely related to service quality and organizational performance. Regarding service quality, researchers mainly explore the relationship between firm size and factors such as audit quality, compliance with accounting standards, and independence. For example, one study found that the audit quality of larger firms is higher than that of smaller firms, but smaller firms perform better in compliance with accounting standards (Li, 2022; Sun, 2011). Regarding economic

performance, researchers focus on the relationship between firm size and income, profit, and growth. One study showed that larger firms have higher income and profit levels than smaller firms, but smaller firms exhibit more substantial growth potential (Christensen et al., 2015; Xu, 2023). In human resource management, researchers focus on the relationship between firm size and factors such as employee turnover, employee benefits, and employee satisfaction. For instance, one study found that larger firms have lower employee turnover rates than smaller firms, but smaller firms offer better employee benefits and higher satisfaction levels (Ashbaugh & Warfield, 2003; Khavis & Krishnan, 2021).

In summary, accounting firm size is a multidimensional concept that includes aspects such as service scope, number of employees, and revenue. Different combinations of these factors may influence the firm's business development and service quality. Therefore, this study will use revenue, number of employees, and number of branch offices to determine firm size.

#### **2.2.4 Classification of Auditing Firm Size**

In different countries and regions, the specific classification levels and classification standards for the size classification of auditing firms are different. However, auditing firm size classification standards are mostly based on the number of personnel, income level, organizational form, comprehensive classification, etc.

##### **1) Classification according to the number of personnel**

The number of professionals is a standard method used to classify the size of auditing firms. Based on this classification, auditing firms can be divided into large, medium, and small firms. Large firms typically have more than 100 professionals, medium firms have 50-100 professionals, and small firms have fewer than 50 professionals (Liu, 2017). According to Article 13 of the *Certified Public Accountants Ordinance* (CCPA Ordinance) issued by the Ministry of Finance in 1986, Chinese auditing firms are classified into four categories based on the number of certified public accountants. First-class firms must have more than 30 certified accountants, second-class firms must have more than 20, third-class firms must have more than 10, and fourth-class firms must have no fewer than 5 certified accountants. This study uses the number of professionals as an essential criterion for classifying auditing

firm sizes.

## 2) Classification by annual operating income

Auditing firms can be classified by annual revenue into high-income, medium-income, and low-income categories. High-income firms typically have annual revenue exceeding \$10 million, medium-income firms have between \$5 million and \$10 million, and low-income firms have less than \$5 million (Ashbaugh & Warfield, 2003). This classification differentiates firms regarding business scope, service quality, and client satisfaction. Article 14 of the CCPA Ordinance states that auditing firms can be classified into four categories based on annual revenue: first-class firms should have annual revenue exceeding 20 million RMB, second-class firms over 10 million RMB, third-class firms over 5 million RMB, and fourth-class firms over 1 million RMB. As the CIPA has developed, the revenue levels of firms have changed significantly, leading to further refinements in revenue-based classifications. This study refines the CCPA ordinance classification by adding a five-category system.

## 3) Classification by Organizational Structure

The Certified Public Accountants Law of the People's Republic of China (1991) classifies auditing firms into single-company and head-office branch firms. At least two CPAs must establish a general partnership firm, while a head-office branch firm requires at least 25 CPAs. Guo (2019) research suggests that small auditing firms are more suited to the single-company model, while medium to large firms are better suited to the head-office branch model.

## 4) Comprehensive classification according to business

The Ministry of Finance of China (2020) classified auditing firms into five categories from high to low: A<sup>+</sup>, A, B, C, and D. Auditing firms are evaluated and classified from six aspects, including accounting firm business and staff size: professional competency; substantive integrated management; quality control; sustained and steady operation; and informatization security. Chinese auditing firms are divided into four categories: large national firms, large regional firms, professional firms, and small firms. National and regional large firms are mainly engaged in auditing and consulting services, professional firms are mainly engaged in taxation and accounting consulting services, and small firms are mainly



engaged in taxation and accounting agency services. Chinese auditing firms are divided into five categories: comprehensive firms, professional firms, small and medium-sized firms, private firms, and foreign-funded firms. Comprehensive firms provide both audit services and consulting services; professional firms only provide professional services in a specific field; small and medium-sized firms are divided into two categories: medium and small based on scale and capabilities, and private firms refer to firms funded and established by natural persons, while foreign-invested firms refer to firms controlled or invested by foreign investors.

### **2.2.5 Study on Auditing Firm Size and Quality of Auditors**

#### **Informatization and Internal Control**

Following a review of the literature on the size of auditing firms, this section will analyze the relationship between auditor quality, informatization, and internal control across large, medium, and small firms.

##### **1) Large Firms**

Large firms stand out in audit quality due to their abundant resources, highly qualified CPAs, and robust internal control systems. Choi et al. (2010), and Nouri and Parker (2020) found that large firms employ more highly skilled auditors and provide extensive training, improving auditors' professional abilities and enhancing audit quality. Qi et al. (2004) further highlighted that large firms have well-established management systems and supervisory mechanisms, effectively reducing potential risks during the audit process. Moreover, DeAngelo (1981) suggested that large firms, due to their market reputation and influence, can maintain independence from clients, thereby reducing external pressure on audit results and improving audit quality. Studies by Chinese scholars also support this view, asserting that large firms improve internal control quality and resource allocation, strengthening the audit process's independence and transparency.

Large firms often have complex business structures and significant data processing needs. Ali and Aulia (2015) pointed out that large firms tend to adopt advanced informatization systems to support their internal control due to the complexity of their operations and the scale of data processing. These advanced systems provide more robust data processing, monitoring, and reporting functions, effectively enhancing internal control implementation and monitoring. Large firms can reduce human error and manipulation risks

by automating data processing and improving data integrity and reliability. Consequently, the internal control implementation and monitoring levels in large firms increase significantly, positively influencing the quality of auditors.

Additionally, large firms can invest more resources to improve auditor quality. Sun (2011) and Choi et al. (2010) found that large firms hire more experienced auditors and provide higher education and training, leading to better audit quality. Meng (2014) noted that large firms often have more excellent reputations and credibility, improving audit quality. Zhang (2023) found that large firms not only attract more clients but also, by maintaining their reputation, credibility, and audit quality, possess more resources and capabilities to handle disputes.

## 2) Medium-Sized Firms

Although medium-sized firms do not possess the extensive resources or broad reputation of large firms, they demonstrate unique advantages in terms of flexibility and adaptability. Han, (2021) indicated that medium-sized firms invest selectively in information technology tools, such as audit-specific software and electronic document management systems, to improve audit efficiency and accuracy. Additionally, medium-sized firms exhibit flexibility in their auditing practices, adjusting strategies and processes based on different client needs, allowing their audit reports to adapt to industry changes quickly. Che et al. (2020) found that despite being relatively resource-constrained, medium-sized firms still provide high-quality audit services through continuous training and improving auditors' professional skills. These characteristics help medium-sized firms, mainly when serving niche industries or small- and medium-sized enterprises, maintain competitiveness in the market.

Medium-sized firms' management systems and informatization levels fall between large and small firms. While medium-sized firms lack the resource advantages of large firms, they can utilize a more flexible operational model and make targeted investments in specific areas (Nouri & Parker 2020). For example, they can use informatization systems to enhance audit process efficiency and accuracy while using flexible strategies to meet client's personalized needs. Despite their relatively limited resources, medium-sized firms can maintain high audit quality through moderate investments in technology and talent.

### 3) Small Firms

Small firms face more significant limitations regarding resources and technology, especially when acquiring advanced information systems and attracting top-tier auditing talent. However, small firms can still improve their internal control and audit quality through innovation and flexible business models. Han (2021) pointed out that small firms can automate data collection and financial reporting using low-cost audit software, which increases operational efficiency and reduces human error. Additionally, the flat organizational structure of small firms enables them to respond quickly to market changes, implementing flexible audit processes, thereby maintaining agility in a competitive market.

Despite their resource constraints, Alzeban and Gwilliam (2014) indicated that small firms can improve audit quality by collaborating with industry networks to share resources and best practices. By partnering with other small firms or industry organizations, small firms can compensate for their lack of size and resources. Small firms primarily rely on the personal skills of their auditors, such as professional knowledge, experience, and judgment (Ali & Aulia, 2015). They tend to use more traditional internal control methods rather than relying on advanced information technology systems. As a result, small firms' internal control capabilities are weaker, and audit quality depends more on the auditors' individual qualities and skills.

## 2.3 Internal control

### 2.3.1 System Management Theory

System Management Theory is an essential theoretical branch of management science, originating from General Systems Theory, proposed by biologist Ludwig von Bertalanffy in the 1950s. He was the first to introduce the concept of systems into organizational management, viewing a business or organization as a whole composed of multiple subsystems, emphasizing the interdependence and coordination between these subsystems (Bertalanffy, 1950). The core idea of system management theory is that management should adopt a holistic approach, focusing on the interactions between the various parts of the system and their impact on the organization's overall objectives. This idea has had a profound influence on management science. Over time and with the development of the theory, new advancements have emerged, as shown in **Table 2.2**.

**Table 2.2** Development of System Management Theory

Scholar	Year	Main Contribution
Ludwig von Bertalanffy	1950	Introduced general systems theory, laying the foundation for systems thinking by emphasizing interdependence and integration.
Kenneth E. Boulding	1956	Developed systems theory further by categorizing systems into different levels of complexity and organization.
Russell L. Ackoff	1960	Applied systems thinking to management, introducing concepts of interrelated subsystems and decision-making processes.
Fremont E. Kast & James E. Rosenzweig	1972	Integrated systems theory into organizational management, emphasizing the need for dynamic interaction and adaptation between organizational subsystems.
Henry Mintzberg	1980	Applied system thinking to organizational structures, recognizing how different configurations impact overall system performance.
Jean Boulton, Peter Allen & Cliff Bowman	2015	Expanded systems thinking in organizational theory through their work on complexity theory, emphasizing the importance of adaptability in uncertain environments.
Elinor Ostrom	2022	Applied systems thinking to governance and collective action, particularly within social-ecological systems.

Note: Collected and organized by the researcher.

Russell Ackoff is another significant contributor to System Management Theory. In the 1960s, he introduced the idea of applying systems thinking to business decision-making and management practices. He argued that the decision-making process in organizations is a complex systemic issue, and managers need to consider the interactions between different subsystems and the impact of the external environment (Ackoff, 1960). His work laid the theoretical foundation for applying system methods in complex decision-making situations. In the development of System Management Theory, the contributions of American management scholars F. E. Kast, James E. Rosenzweig, and R. A. Johnson are particularly noteworthy. In 1963, they

published the book *System Theory and Management*, where they first applied the principles of systems theory to management. They introduced viewing management as an open system composed of factors such as people, materials, and the environment (Kast et al., 1963). Their research showed that organizational management needs to focus on the dynamic interactions between different subsystems and their adaptability to the external environment. This system perspective gave managers a new approach, enabling them to improve organizational performance by coordinating internal resources and interacting with external factors.

In the 1970s, Kast and Rosenzweig continued to deepen the application of System Management Theory, emphasizing that the various subsystems within an organization (such as production, marketing, and human resources) are interdependent. Their successful operation depends on effective communication, feedback mechanisms, and sensitivity to environmental changes (Kast & Rosenzweig, 1972). They pointed out that a business is an open system that must interact with its external environment and adjust its structure and resource allocation promptly to respond to changing market demands and technological innovations. Entering the 1980s, Henry Mintzberg further applied systems thinking to studying organizational structures. He proposed that different organizational structures and configurations directly impact the system's overall performance. His research showed that organizational management's various levels, functional departments, and task distributions form a complex system network. Managers should optimize the relationships between these elements to enhance organizational effectiveness (Mintzberg, 1980). In recent years, the development of System Management Theory has extended to more complex and uncertain management environments. Jean Boulton, Peter Allen, and Cliff Bowman explored how system management can enhance organizational adaptability and flexibility in uncertain and rapidly changing environments through complexity theory (Boulton et al., 2015). They emphasized that businesses must possess sufficient adaptive capacity to cope with the uncertainty and complexity of the environment, which has become increasingly important in modern management amid globalization and technological change.

In conclusion, System Management Theory has developed a rich theoretical foundation and practical applications in management science. From its initial focus on

system integration to today's complexity and adaptability management, the theory has continually pushed managers to optimize organizational structures, improve decision-making efficiency, and adapt to changing environments from a holistic system perspective. Through System Management Theory, managers can better understand and control the complex relationships within and outside the organization, ensuring long-term organizational success in dynamic environments.

### **2.3.2 Definition and Development of Internal Control**

Internal control originated in the United States in the early 20th century. In 1992, Montgomery, RH proposed the prototype of internal control - the internal containment system. In the book " Auditing Theory and Practice " he pointed out that "an internal containment system refers to a system in which one person cannot fully control the account and another person cannot control it independently." His point of view emphasizes that mutual control and auditing have developed and are paid attention to in job settings and personnel division of labor, which is mutual restraint. This view is based on two assumptions: the probability of two or more people making the same mistake unconsciously at the same time is much lower than the probability of one person making a mistake; the probability of two or more people consciously and maliciously colluding to commit fraud The probability is also lower than the probability of one person committing fraud. He believes that internal control can effectively avoid unconscious mistakes and conscious fraud. This approach is the earliest prototype of internal control. Since then, internal control has gradually developed, been accepted by more and more countries, and used by more and more enterprises. As the concept of internal control has evolved, the definition and meaning of the concept have been increasingly discussed.

As the concept of internal control has evolved, the definition and meaning of the concept have been increasingly discussed. In 1939, the concept of internal control appeared for the first time in the American Institute of Certified Public Accountants (AICPA) "Expansion of Audit Procedures" and pointed out that the scope of audit sampling and testing has developed based on the independent auditor's judgment of the effectiveness of internal control. In the same year, AICPA published a special note on "Internal Control - Organizational Elements and CPA Independence, "the first time a private audit organization defined the concept of internal control. Since then, internal control has gradually been widely

accepted by the industry and academia and has gradually become one of the core contents of business management and accounting research. With the continuous development of systems management theory and practice, the concepts and standards of internal control are constantly updated and improved. " Audit Procedures Announcement No. 29 " of 1958 is a specific auditing system issued by the AICPA that limits the scope of auditors' responsibilities for evaluating a company's internal controls to accounting controls. In April 1988, the AICPA promulgated "Audit Standards Announcement No. 55 " to integrate accounting control and management control and, at the same time, regarded the internal control environment of the enterprise as an essential part of the internal control component.

Currently, the systems management theory, generally accepted and recognized worldwide, is proposed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In 1992, COSO proposed the "Internal Control-Integrated Framework " and gave internal control a more normative meaning, that is, internal control is formulated by the company's board of directors, management, and other personnel to reasonably ensure the efficiency and effectiveness of the company's operating activities: effectiveness, reliability of financial reporting, and compliance with laws and regulations. Five elements of internal control are proposed: control environment, risk assessment, control activities, informatization and communication, and monitoring. The "Internal Control - Enterprise Risk Framework" promulgated in 2003 added three internal control elements to the original internal control: event identification, goal setting, and risk analysis, thus forming a relatively complete internal control framework containing eight elements. In September 2004, the COSO Committee's " Enterprise Risk Management-Integrated Framework " was released. The framework states, "Enterprise risk management is a process, implemented by an entity's board of directors, management and other personnel, applied to strategy development and throughout the enterprise, to identify potential events that may affect the entity and manage risks. so that it is within the risk capacity of the entity and provides reasonable assurance for the achievement of the entity's objectives." In May 2013, the COSO committee " Internal Control-Integrated Framework (2013)" was released. The framework states that "internal controls are a process implemented by an entity's board of directors, management and other employees to provide reasonable assurance that operating, reporting and compliance objectives are achieved."

**Table 2.3** The Development Process of Internal Control in the United States

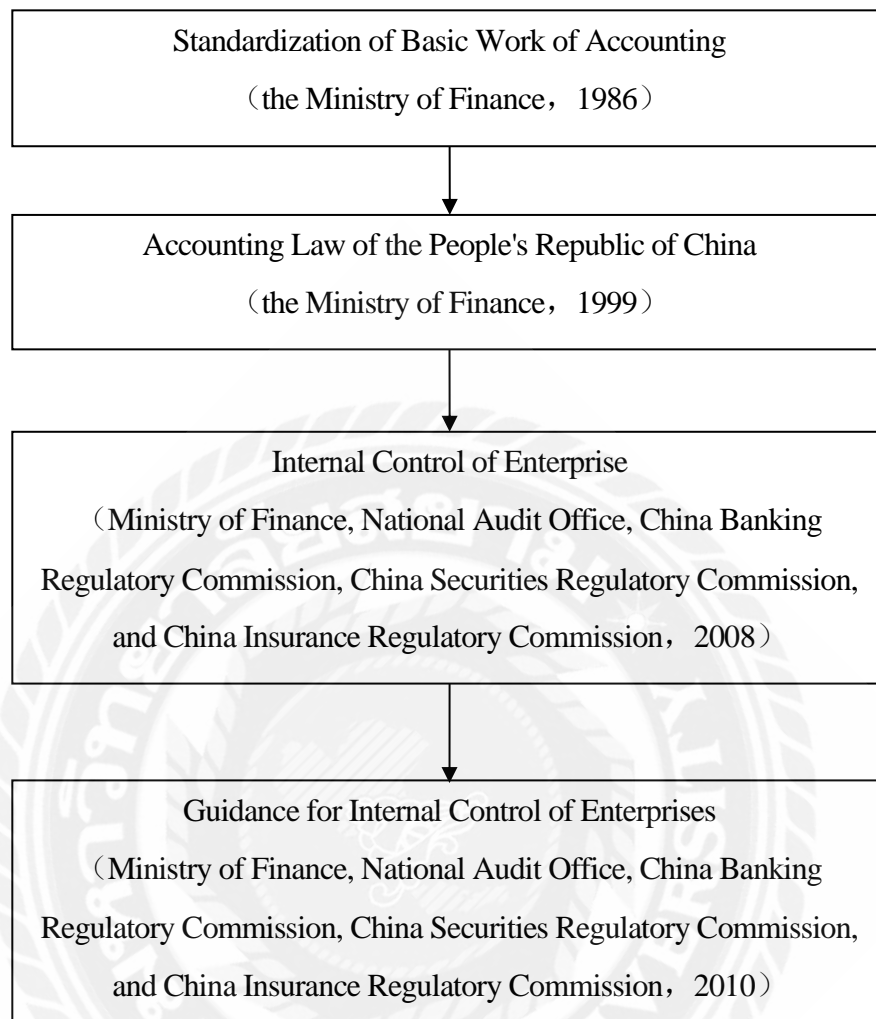
Scholar	Development Process
AICPA (1939)	One of the earliest systematic definitions of internal control, it first proposed the concept, objectives, and elements of internal control and defined it as an accounting control system.
AICPA (1958)	"Audit Procedure Announcement No. 29 " will issue a specific audit system that limits the scope of auditors' responsibilities for evaluating the company's internal controls to accounting controls.
AICPA (1988)	"Audit Standards Announcement No. 55 " integrates accounting control and management control and regards the enterprise's internal control environment as an essential internal control component.
COSO (1992)	Internal control is a process formulated by the company's board of directors, management, and other personnel to reasonably ensure the achievement of goals such as the efficiency and effectiveness of its operating activities, the reliability of financial reports, and compliance with laws and regulations.
COSO (2004)	The framework states, "Enterprise risk management is a process implemented by an entity's board of directors, management, and other personnel, applied to strategy development and throughout the enterprise, to identify potential events that may affect the entity and manage risks to be within the entity's risk capacity and provide reasonable assurance for the achievement of the entity's objectives.
COSO (2013)	The framework states that "internal controls are a process implemented by an entity's board of directors, management and other employees to provide reasonable assurance that operating, reporting and compliance objectives are achieved."

Note: Collected and organized by the researcher.

1986 stipulates specific provisions on internal control and is consistent with the American Institute of Certified Public Accountants (see **Figure 2.1**). It integrates control environment factors into the internal control structure to form the three elements of control environment, accounting system, and control procedures. In 1999, the "Accounting Law of the People's Republic of China" was promulgated for the first time in legal form to provide for enterprises to establish and improve internal control, laying the foundation for the subsequent development of internal control of enterprises in China. In 2008, five ministries and commissions, including the Ministry of Finance, National Audit Office, China Banking Regulatory Commission, China Securities Regulatory Commission, and China Insurance



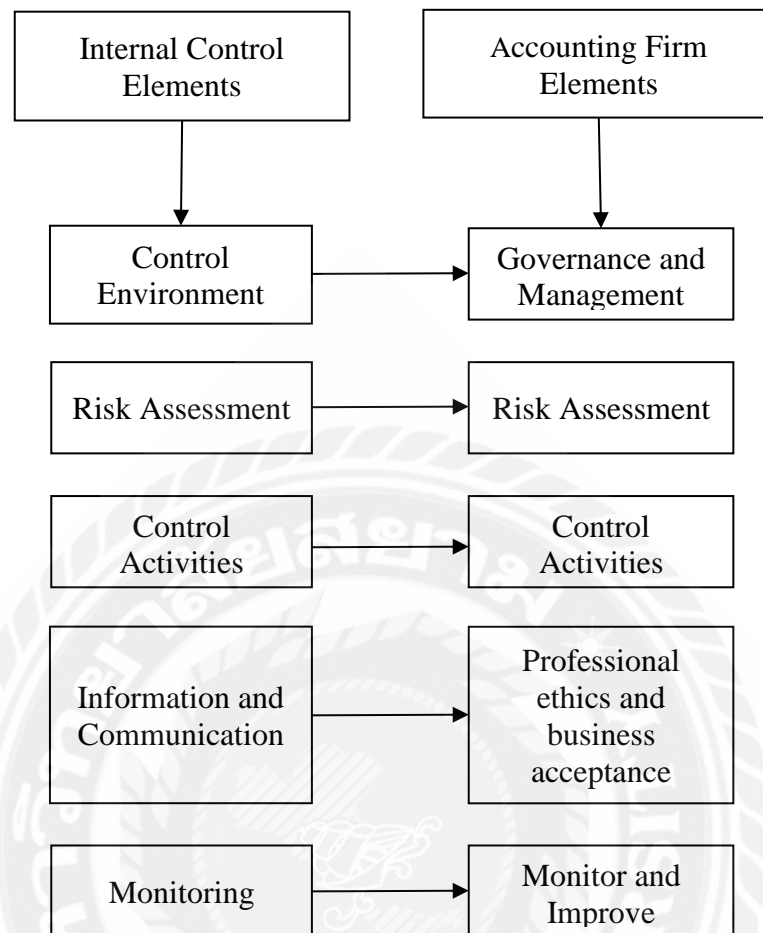
Regulatory Commission, jointly issued the "Basic Standards for Enterprise Internal Control". Internal control "is a process implemented by the company's board of directors, supervisory board, management, and all employees to achieve control objectives." "The goal of internal control is to reasonably ensure the legal compliance of corporate operations and management, asset security, the authenticity and completeness of financial reports and related informatization, improve operational efficiency and effectiveness, and promote the realization of corporate development strategies." In April 2010, five ministries and commissions including, China, the China Banking Regulatory Commission, and the China Insurance Regulatory Commission had just jointly issued the "Enterprise Internal Control Supporting Guidelines." China's enterprise internal control standard system has been completed, and the enterprise internal control standard has been established. Entering the comprehensive application stage. The full implementation of the "Enterprise Internal Control Supporting Guidelines" in China in 2012 marked an epoch-making milestone in the development history of internal control. In January 2014, the Ministry of Finance and the China Securities Regulatory Commission issued the "Information Disclosure Preparation Rules for Companies that Offer Securities to the Public No. 21 - General Provisions on Annual Internal Control Evaluation Reports", which clarified the components of the internal control evaluation report and explained in detail specific disclosure content and requirements. In June 2017, the Ministry of Finance issued the "Internal Control Standards for Small Businesses (Trial) " to strengthen the internal control construction of small businesses and improve their risk prevention capabilities and operational management levels.



**Figure 2.1** Construction Stage of Internal Control  
(Source: Compiled by researcher, 2023)

### 2.3.3 Internal Control Elements of Auditing Firm

According to China's "Basic Standards for Internal Control," accounting firms' critical internal control elements include management responsibilities, risk assessment, control activities, informatization and communications, and monitoring (see **Figure 2.2**). Chinese scholars conducted an extended study on accountants' internal controls, incorporating organizational structure and personnel management into internal controls. Through their implementation and maintenance, the effectiveness of internal control and business operation efficiency of accounting firms can be improved.



**Figure 2.2** Internal Control Elements and Auditing firm' Elements  
(Source: Compiled by researcher, 2023)

The accounting firm's management has developed responsibility for the effectiveness of internal controls and developed, implemented, and maintained internal control systems. Management should formulate an internal control system, supervise its implementation, and take timely and effective corrective measures for problems in internal control. From the perspective of improving the internal control system of accounting firms, management should formulate an internal control system, supervise its implementation, and take timely and effective corrective measures for problems in internal control. Chinese scholars conducted an empirical study on the construction of internal controls in accounting firms and analyzed the responsibilities and roles of management in internal controls. Management should develop an internal control system and supervise and manage its implementation to ensure the effectiveness and compliance of internal control. Management plays a vital role in the internal control of accounting firms. It should formulate internal control systems and

supervise its implementation. Timely and effective corrective measures have been developed to address problems in internal control.

Auditing firms should assess their risks and develop appropriate internal controls to address them. Moeller's (2007) study of the risk-based internal control method points out that auditing firms should conduct risk assessments based on their characteristics and business conditions and formulate corresponding internal control measures to reduce the impact of risks on the business. Chinese scholars proposed a risk assessment method for the internal control of an accounting firm and discussed the prevention and control strategies of internal control. Spira and Page (2003) and Yan (2022) Based on the problem of risk control internal control optimization of auditing firms, internal control measures for different risk types are proposed, and an internal control evaluation index system is established based on the actual situation to evaluate the internal control Monitor and evaluate effects. The risk assessment of the internal control of an auditing firm is a vital link.

Auditing firms should design and implement appropriate control activities, including control activities in internal auditing, accounting systems and procedures, risk management, informatization technology security, etc. Auditing firms should strengthen the construction and management of internal control activities, including improving internal control procedures and strengthening internal auditing. Qi (2020) proposed a set of evaluation indicators for internal control activities in the study to help auditing firms effectively monitor and evaluate internal control activities. There are risks in the internal control activities of auditing firms, and risk control requires corresponding countermeasures to ensure the effectiveness and stability of internal control activities. The construction and management of internal control activities of an auditing firm is a crucial link.

Auditing firms should ensure that their internal control systems include appropriate informatization and communication channels so that effective communication between employees and management can occur. Informatization and communication in the internal control of an auditing firm are among the five elements of internal control. It includes the transmission and exchange of all informatization related to internal control, including financial informatization, non-financial informatization and internal control information. In auditing firms, the availability of information and communications is critical to ensuring audit work's accuracy, completeness, and timeliness. Shleifer and Vishny's (1997) research found

the importance of informatization and communication and emphasized that the design and implementation of internal control systems should focus on informatization and communication aspects. In the evolution process of internal control of auditing firms, the development of informatization and communications is particularly prominent. As the requirements of regulatory agencies become more stringent, auditing firms are increasingly required to establish more robust and complete informatization and communication systems to meet the requirements of regulatory agencies. The assessment of the effectiveness of internal controls in auditing firms requires an assessment of the effectiveness of informatization and communications, which is one of the critical factors for the success of internal control systems, and auditing firms should continue to strengthen the management and supervision of informatization and communications. Auditing firms should establish appropriate organizational structures and division of responsibilities to ensure the effectiveness of internal controls. The organizational structure of an auditing firm's internal control is one of the five elements of internal control (Yan 2022).

Monitoring and improvement are the decisive factors for the functioning of internal control. Many companies have built internal control systems, but they are ineffective. This is because of the lack of supervision, resulting in internal control defects not being discovered in time. The main content of internal supervision is divided into two parts: daily supervision and informatization feedback. The purpose of supervision is to promptly discover deficiencies in internal control, including blind spots in the scope of internal control, defects in the internal control system, dereliction of duty, dereliction of duty, and even dereliction of duty by personnel executing the departmental control system. Fraud. The internal control of an enterprise is a dynamic process of continuous adjustment, gradual improvement, and continuous optimization (Yakubu & Williams, 2020).

#### **2.3.4 Impact of Internal Control on Audit Quality**

Internal control provides reliable audit evidence that enables the auditor to assess the audited entity's financial position more accurately. Reliable audit evidence facilitates the auditor's independent and objective audit work and supports his or her reasonable evaluation of the accuracy and completeness of the financial statements. Internal control reduces the uncertainty and the likelihood of error (Gramling & Schneider, 2018). The auditor's high professionalism and skill ensure the auditing firm implements internal control management

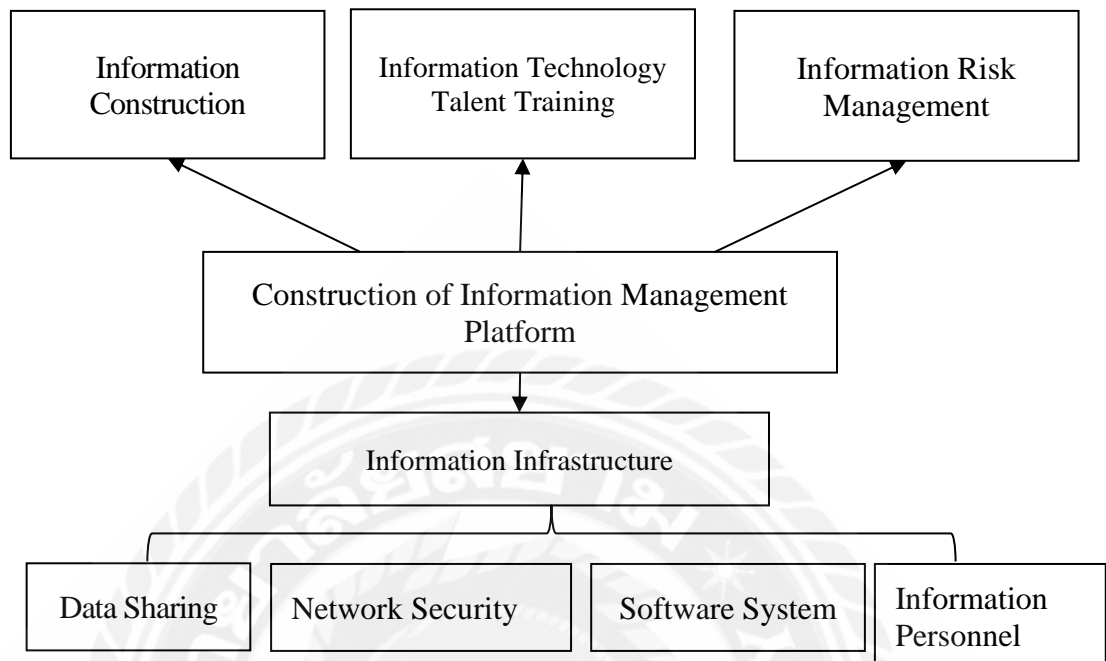
well. The auditor's fairness and integrity in the audit process contribute to internal control (López et al., 2013; Yan 2022). Auditors follow ethical guidelines to maintain audit independence and standardized internal control procedures. Internal control plays an essential role in the audit quality of accounting firms through reliable audit evidence, reducing audit risk, and shaping the ethical standards of auditors.

Information technology can significantly improve efficiency and accuracy in the auditing process, but the complete translation of this impact into improved audit quality depends on the effectiveness of internal controls. Good internal controls ensure the reliability and integrity of data, thus providing a reliable basis for auditing, which improves audit quality. Information technology provides a robust audit trail, enabling the audit process to understand better the audited entity's business and internal control environment (Bai & Hu, 2020). Good internal controls ensure the robustness and security of information systems and help prevent data tampering and manipulation, thus improving audit quality.

## **2.4 Informatization**

### **2.4.1 The Informatization Connotation of Auditing Firm**

Its use in financial and accounting processes is proliferating, leading to increased research and professional attention to risk, control, and auditing of accounting informatization systems. In this case, informatization is a core component of information audit, financial audit, and governance processes (Brandas et al., 2013; Han, 2021). The continued digitization of the economy brings challenges and opportunities to the audit profession, requiring both auditing firms and their clients to adapt, and the consequences of using new technologies in the audit process provide many future research opportunities (Tiberius & Hirth, 2019). Informatization refers to using information technology to change the model and management of auditing firms, improve service quality and efficiency, and thereby improve the overall competitiveness of auditing firms (Chambers, 2011). It mainly includes informatization infrastructure construction, informatization management platform construction, business informatization application, informatization talent training, strategic planning, and risk management (see **Figure 2.3**). Through informatization construction, auditing firms can improve efficiency, reduce costs, improve quality, expand service scope, enhance competitiveness, better meet customer needs, and adapt to market development requirements.



**Figure 2.3** Auditing Firms Informatization Construction

(Source: Chambers, 2011; Han, 2021)

First is the construction of an auditing firm's information infrastructure. Auditing firm informatization infrastructure construction focuses on data sharing, network security, and informatization. Personnel training and other aspects. Auditing firms must establish a complete data-sharing mechanism to improve work efficiency and data quality. Auditing firms need to take a series of measures, such as establishing secure networks and strengthening the management and monitoring of informatization systems, to ensure informatization security. In terms of informatization system application, auditing firms need to choose suitable informatization systems based on actual needs to improve work efficiency and quality.

Second, the construction of auditing firm business informatization. Applying business informatization to auditing firms focuses on audit services and risk management. In terms of the implementation process, auditing firms need to take a series of measures, such as improving informatization systems, strengthening personnel training and management, and improving informatization security, to ensure the smooth implementation of informatization applications (Song & Tang, 2021). The business application of the

informatization connotation of auditing firms should focus on practical application to improve work efficiency and service quality. In terms of practical application, auditing firms need to focus on the construction and management of informatization systems and the continuous promotion and improvement of informatization applications. The business application of the informatization connotation of auditing firms should focus on applying and managing informatization technology to improve work efficiency and service quality. In terms of informatization technology application, auditing firms need to focus on the construction and management of informatization systems and the continuous promotion and improvement of informatization applications. Auditing firms need to strengthen the planning and management of informatization applications to ensure the smooth implementation of informatization applications.

Third, the cultivation of informatization talents in auditing firms. Auditing firms need to focus on cultivating professional talents with informatization skills and abilities to cope with the challenges of the information age. Auditing firms must strengthen the training and introduction of informatization talents and provide corresponding career development opportunities to attract and retain talents (Song & Tang, 2021). Auditing firms need to strengthen their training and improve their informatization technology skills and capabilities to adapt to the development trend of the informatization age. Auditing firms need to focus on talent introduction, talent training, and talent incentives to establish a talent training model consistent with auditing firms under the background of informatization. Auditing firms must focus on cultivating professionals with informatization skills and abilities to cope with the challenges of the information age. Regarding training, auditing firms need to focus on informatization technology skills and ability training and carry out corresponding career development plans and incentive mechanisms to attract and retain talents. The training of informatization talents in auditing firms requires continuous improvement of the informatization skills and abilities of professional talents to adapt to the development trend of the informatization age (Peng, 2019).

Fourth, to strengthen informatization risk management in auditing firms, it is critical to establish comprehensive risk management systems, including emergency plans, to address data protection and security risks. Recent research supports the need for robust risk identification and prevention strategies that integrate advanced technologies, such as data



mining and big data analytics, to manage risks effectively and ensure business stability (Yuan, 2023). These efforts help auditing firms enhance their ability to protect informatization security and improve service capabilities in a technology-driven environment.

#### **2.4.2 The Development of Auditing Firm Informatization Construction**

The informatization construction of auditing firms is an integral part of the development of enterprise informatization. Since the late 1980s, the application of informatization technology has undergone several significant stages. In 1989, informatization technology was first proposed to improve the efficiency and accuracy of accounting work, reduce costs, enhance the quality of financial reports, and promote enterprise development. By 2012, the introduction of ERP systems marked further progress in the informatization of auditing firms. Then, in 2017, new technologies such as cloud computing, big data, and blockchain accelerated auditing firms' intelligent and digital transformation. In 2021, the entry into the AI era, driven by artificial intelligence, made the impact of these technological revolutions on auditing firms even more evident. Studies have shown that the widespread application of these technologies improves work efficiency, strengthens information security management, and reduces operational risks (Morawiec & Sołtysik-Piorunkiewicz, 2022; Faccia & Petratos, 2021).

#### **2.4.3 Basic Elements of Auditing Firm Informatization**

An auditing firm is also an enterprise organization, and the information development of enterprises needs to match the development of the industry (Dai & Vasarhelyi, 2017). Research on the essential elements of auditing firm informatization has become a focus for scholars. The essential elements of informatization are the basis for realizing the informatization of auditing firms. Therefore, a summary and combing of relevant literature found that hardware facilities, data management, information security, and personnel training are all basic elements of auditing firm informatization. They interact together and form the basis of informatization (Bharadwaj, 2020).

#### **2.4.4 Informatization Enhances Management Efficiency**

Abou-El-Sood et al. (2015) conducted interviews and distributed questionnaires to auditors from Big Four and international non-Big Four auditing firms. The research results indicated a high reliance on auditing technology in technical and administrative procedures,

especially in risk assessment. The study found that the use and importance of audit technology were higher in Big Four firms, where auditors had less experience but demonstrated higher technological expertise, particularly among those in management positions. These findings provide valuable guidance for policymakers regarding the opportunities and challenges of implementing informatization technology in the audit process.

Li et al. (2020) demonstrated that informatization in auditing firms enhances management practices by streamlining customer relations, tracking project progress, and improving quality control through integrated platforms, leading to cost reductions and risk mitigation. Expanding on this, Zhang et al. (2022) proposed a framework to assess the impact of these technologies, highlighting their role in boosting productivity and service quality. However, they also cautioned that challenges like security risks and the potential for low returns on investment must be addressed through comprehensive assessments to ensure sustainability. Additionally, Zhang et al. found that customer acceptance of informatization technologies is influenced by factors such as age, education, and profession, suggesting that firms need to tailor their offerings to meet the specific needs of their clients, thereby improving customer satisfaction and maximizing the benefits of these technological advancements.

#### **2.4.5 Research on the Impact of Informatization on Audit Quality**

Informatization can improve the accuracy and consistency of auditing firms' work (Austin et al., 2021). By using accounting software, complex financial calculations and analyses can be automated, reducing the chance of human error. Informatization of auditing firms can improve the quality of work, especially in terms of accuracy and consistency. Factors such as informatization technology, big data, and internal audit quality can all positively impact audit quality. Bibler et al. (2023) experimentally proved that innovative thinking significantly improves auditors' ability to develop effective fraud procedures. Furthermore, this effect is amplified when auditors generate client insights because this intervention target increases creativity and cognitive flexibility, further improving the quality of auditors. Chinese scholars explored the impact of accounting informatization systems on financial reporting quality. The results show that accounting informatization systems can significantly improve the accuracy and consistency of financial reporting. Chinese scholars discussed how to use technology to improve audit quality. The findings show that technology

can reduce manual errors and improve audit accuracy and consistency. Austin et al. (2021) explored the impact of big data on audit quality is explored. The research results show that big data can improve the accuracy and consistency of audits and reduce audit risks. Chinese scholars explored the impact of informatization technology and internal control on audit quality. The findings indicate that informatization technology can improve audit accuracy and consistency, while internal control can enhance the impact of informatization technology on audit quality. The use of informatization can directly affect the judgment of CPA and ultimately affect the effectiveness and efficiency of auditing. (Janvrin et al., 2008). A field survey of 181 auditors in four countries revealed that auditors extensively use various auditing applications, including analytical procedures, audit report writing, electronic working papers, Internet search tools, and sampling. Bibler et al., (2023) Data analysis can help CPA effectively deal with the risk of material misstatements caused by fraud. It has been experimentally demonstrated that innovative thinking significantly improves auditors' ability to develop effective fraud procedures. Furthermore, when CPA generates client insights, this effect is amplified because this intervention target increases creativity and cognitive flexibility, further improving auditors' decision-making quality. With the improvement of audit informatization, the number of electronic audit evidence has multiplied. The authenticity of electronic audit evidence before storage is difficult to guarantee, and it is easy to be tampered with and repudiated after storage. Guan (2023) advocates leveraging big data and cloud computing technologies to develop new audit models, such as the overall audit model and continuous auditing. These innovations enable auditors to uncover financial operations and corporate governance issues while promoting the use of relational evidence for more efficient, data-driven audits. However, Li also highlights challenges like security risks and a lack of auditor expertise in advanced technologies. He stresses the need to shift toward continuous auditing, supported by cloud platforms capable of processing large datasets. He emphasizes the importance of training auditors in specialized data analysis to fully realize these benefits.

#### **2.4.6 Research on the Impact of Informatization on Internal Control**

Integrating information technology into auditing practices has revolutionized how auditors approach their work, allowing them to process and analyze vast amounts of data with unprecedented speed and accuracy. This technological advancement has significantly

enhanced the ability of auditors to assess and monitor internal controls, leading to a marked improvement in overall audit quality (Jiang et al., 2019). In the current landscape, where businesses increasingly rely on complex data systems, the role of informatization in auditing has become even more critical. Betti et al. (2021) study highlights how digitalization increases the use of data analytics in auditing and enhances the performance of consulting activities within internal audit functions. This aligns with your description of informatization, which empowers auditors to enhance tracking capabilities and conduct more in-depth evaluations of internal controls. Additionally, digitalization leads to efficiency gains by automating routine tasks and allowing auditors to focus on higher-level activities like risk identification and analysis. The study also emphasizes the importance of addressing challenges like data security and the need for proper training of auditors in handling advanced technology, ensuring they can fully utilize the benefits while safeguarding sensitive information.

The benefits of informatization extend to auditing firms' broader development and competitiveness. By adopting advanced technological solutions, these firms can offer more sophisticated and tailored services to their clients, addressing the specific challenges they face in an increasingly digital and data-driven world. This enhances client satisfaction and positions the firm as a forward-thinking and innovative leader in the industry. As a result, informatization serves as a foundation for auditing firms' sustained growth and success, enabling them to deliver high-quality audit services that meet their clients' evolving demands.

## **2.5 Quality of Auditors**

### **2.5.1 The Connotation of the Quality of Auditors in Auditing Firm**

AICPA expresses professional competency as an ability to perform high-quality duties competently, efficiently, and appropriately. In contrast, core competencies are a unique combination of skills, knowledge, and techniques that provide value and results to clients. The Canadian Institute of Certified Public Accountants (CGA) believes that professional competency is the combination of knowledge, skills, talents, and behaviors designed to enable auditors to perform their duties effectively. In addition, the International Federation of Accountants (IFAC) pointed out in the "International Education Standards for Professional Accountants" that competency refers to the ability to assume a specific job role according to

established standards in a natural work environment. The competency elements of professional accountants include professional knowledge, professional skills, professional values, ethics, and attitudes. Li (2010) initiated research on the competencies and qualities of auditors in China, identifying four key aspects: professional knowledge, personal skills, audit tool application, and ethics. Zhang (2015) expanded on this by analyzing the competency gap in Chinese enterprises, proposing a framework with three dimensions: professional knowledge, skills, and traits. Wang (2019) introduced personality types to explore the relationship between auditors' competencies and job performance, emphasizing that qualities like independence, teamwork, and ethics are crucial for ensuring audit quality and the competitiveness of firms.

**Professional knowledge:** Auditors need to have solid professional knowledge in accounting, finance, tax laws, etc., and understand industry characteristics and auditing standards to carry out audit work correctly. The definition of professional knowledge is relatively broad. The first is essential knowledge, including general educational and cultural knowledge, communication skills, rational thinking and critical knowledge, mathematical analysis knowledge, scientific and cultural knowledge, etc.; the second is organizational and corporate knowledge, specifically Helping CPAs to understand the relevant knowledge of enterprises, governments, and non-profit organizations, and help CPAs master knowledge in related fields and disciplines; the third is informatization technology knowledge. CPAs should master the knowledge of informatization storage, transmission, and output and flexibly master and use computers. Understand informatization technology knowledge related to e-commerce, internal control, and operation management; the fourth is accounting, auditing, and related knowledge; the fifth is knowledge of relevant policies, regulations, and standards, including the "China Certified Public Accountants Auditing Standards," "Chinese Certified Public Accountants" "Code of Professional Ethics" and "Accounting Law of the People's Republic of China," etc., and also need to master the knowledge of policies and regulations outside the industry.

**Professional skills:** Auditors need specific data analysis abilities, risk assessment abilities, problem-solving abilities, and communication skills to effectively carry out audit work and communicate and collaborate with clients and audit teams (Wang, 2019). Professional skills are skills and methods that can assist CPAs in their work. They mainly

include the following parts: first, the ability to cope with development and change, that is, adaptability to changing environments, observation skills, and learning abilities; second, interpersonal skills and communication skills, precisely communication skills, expression skills, and negotiation skills; third, technical and application skills, including mathematical skills, informatization technology skills, decision-making modeling and risk analysis capabilities, and also the ability to measure, report and Ability to comply with laws and regulations. The fourth is organizational and business management skills. CPAs should have business management, market development, and strategic coordination capabilities.

**Professional ethics:** Auditors must maintain an independent and objective audit point of view without being influenced by clients and other stakeholders and always adhere to the principles of fairness and objectivity. Auditors need to have a high degree of professional ethics, especially in terms of integrity, confidentiality, and the courage to take responsibility to ensure the integrity and objectivity of the audit process. Specifically, it refers to first social responsibility. CPA should understand that social work is the basis of its existence and ensure that its work is beneficial to the public; second, independence, CPA should have formal and essential independence to ensure that there is no interesting relationship with either the entrusting party or the entrusted party; third, objectivity and impartiality, the CPA has developed down-to-earth in the work process, step by step, and maintain objectivity and impartiality at all times; fourth, Professional prudence. CPAs must always observe professional prudence during work, maintain due professional ethics and standards, be careful when selecting clients, and have corresponding professional skepticism.

**Teamwork:** Auditors need to have a good spirit of teamwork and be able to communicate and collaborate effectively with other members of the audit team, making full use of their respective strengths to complete the audit work together. Chinese scholars studied the quality of Chinese auditors, and colleagues drew on the auditor competency and quality frameworks of Canada, the United States, Australia, and other countries and believed that teamwork is one of the crucial factors of CPA.

### **2.5.2 Factors Affecting the Quality of Auditors in Auditing Firm**

Educational background, work experience and skills, ethics, and professional conduct (the individual's moral development, moral emotion, moral cognition, and self-efficacy) impact the ethical decision-making process, organizational culture, and atmosphere. Ethical

leadership and internal audit function all have a significant positive impact on ethical decision-making); communication and interpersonal skills (are essential aspects of the quality of auditors in auditing firms. Auditors' good communication skills can improve audit quality, gain the trust and recognition of clients, and thus promote the business development of auditing firms), teamwork, and leadership skills (Leadership behavior has a significant positive impact on auditor performance, especially under high-stress conditions), and, technology and innovation capabilities (are the necessary qualities and skills for auditors of auditing firms in the era of big data), and thereby, improving audit quality.

#### 1) Educational background and professional knowledge

Educational background and professional knowledge are some aspects of the quality of auditors affecting the quality of auditors in auditing firms (Zan & Hong, 2012). Education, professional knowledge, and training significantly impact auditors' skills, quality, and ethical sensitivity. Jaber and Mohammad (2016). Analyzing the basic principles of professional ethics of Jordanian certified public accountants in the audit process, it is determined that awareness of professional independence requirements is essential. Research has found a positive relationship between professional ethics and independence. Chinese scholar's empirical results show that after controlling variables such as firm size, customer importance, company size, company growth, company profitability, and company cash flow, the professional ability of auditors (i.e., the proportion of CPAs), The academic structure has a significant impact on audit quality. This provides data support for improving audit quality by improving auditors' academic level and professional competence.

#### 2) Work experience and skills

Work experience and skills are some of the aspects of the quality of auditors affecting the quality of auditors in auditing firms. Work experience and professional knowledge can improve the auditor's judgment and decision-making ability. At the same time, the task's complexity will also affect work experience's impact on audit judgment performance. Auditor expertise has a greater impact on audit quality than experience.

Espinosa-Pike et al. (2021) explored the impact of auditors' work experience and professional knowledge on audit judgment. The research results show that experience and professional knowledge significantly impact audit judgment and decision-making. At the

same time, experience and professional knowledge significantly impact auditors' judgment ability. Yazid and Wiyantoro's (2018) research shows that auditor competency variables have a significant positive impact on professional prudence, and work experience variables have a significant positive impact on internal audit quality. Chinese scholars explored the impact of auditors' professional knowledge and experience on audit quality. The research results show that professional knowledge and experience significantly impact audit quality, and professional knowledge has a more significant impact on audit quality than experience.

### 3) Ethics and professional conduct

Morality and professional conduct are aspects of the quality of auditors that affect the quality of auditors of auditing firms (Zan & Hong, 2012). The individual's moral development level, moral emotion, moral cognition, and self-efficacy all impact the ethical decision-making process, while organizational culture and atmosphere, ethical leadership, and internal audit function all significantly positively impact ethical decision-making—the influence of individual and organizational factors on the ethical decision-making process. The research results show that the individual's moral development level, moral emotion, moral cognition, and self-efficacy will all impact the moral decision-making process, and organizational culture and atmosphere will also affect the individual's moral decision-making. Ethical leadership, the internal audit function, and ethical strength impact financial reporting decisions.

### 4) Teamwork and leadership skills

Teamwork is an integral part of the quality of auditors in auditing firms. Auditors improve work efficiency through teamwork, and the stronger the leadership ability of the leaders in the audit team, the better the development of the auditing firm. The impact of teamwork and leadership on the audit quality of auditing firms. By analyzing the data of 21 auditing firms in China, the study found that teamwork and leadership significantly impact audit quality and put forward some suggestions to improve the teamwork and leadership of the audit team—the impact of Chinese auditing firm leadership behavior on auditor performance (Jenkins et al., 2008). The study results show that leadership behavior has a significant positive impact on auditor performance, especially under high-stress conditions; the impact of leadership behavior on auditor performance is more pronounced—the impact of leadership style on



employee job satisfaction and organizational commitment. The study results show that the bank employees who participated in the survey generally believe that leadership style significantly impacts employees' job satisfaction and organizational commitment (Jenkins et al., 2008). Therefore, in auditing firms, leaders should focus on improving leadership skills to facilitate the collaboration and performance of the audit team.

#### 5) Technology and innovation capabilities

Technology and innovation capabilities are the necessary qualities and skills for auditors of auditing firms in the era of big data. Many scholars have explained and summarized technology and innovation capabilities based on the literature review. The technical skills and training needs of auditors in the digital age were surveyed, and 310 auditors in Spain were surveyed. The results show that technical skills are essential for auditors and must be continuously learned and updated. In addition, auditors also need skills related to data analysis and mining (Teece, 2012). The study argues that training and education can improve auditors' technical capabilities and audit quality. The impact of innovation, informatization technology, and internal control on audit quality. The findings show that innovation and informatization technology significantly impact audit quality, while internal control has no significant impact. According to the study, auditors must have innovation and informatization technology capabilities to improve audit quality. The impact of audit technology on audit quality and related research at home and abroad was analyzed. The study found that audit technology can improve audit efficiency and accuracy and reduce audit risk. Auditors need to master and apply audit techniques to improve audit quality. Technology acceptance, perceived security, and user experience impact auditors' technical capabilities. The findings indicate that technology acceptance and user experience positively impact auditor technical competence, while perceived security does not significantly impact technical competence. The study suggests that auditors should increase their awareness of technology.

#### **2.5.3 Relevant Study on the Quality of Auditors in Auditing Firm**

Auditors of auditing firms have been systematized, and the elaboration on the quality of auditors has been continuously improved.

### 1) Study on the selection and appointment of auditors of auditing firms

Scholars use field research and interviews to study that when auditing firms select auditors, they pay more attention to the candidates' professional qualities, ethical standards, and interpersonal communication skills than past internship experience or school performance (Ghosh & Moon, 2005). The professional quality and industry experience of auditors can be obtained by surveying audited companies. Auditors with more industry experience and professional knowledge can provide higher-quality audit services and get better evaluations and recognition.

### 2) Study on the impact of the auditor's quality on business

Auditors are more inclined to follow social norms than to comply with regulations or company policies. In addition, auditors' work experience and moral education significantly impact their ethical decision-making. The experiment proves the influence of an auditor's professional skepticism and client pressure on audit decision-making. Auditors' professional skepticism can reduce the impact of client pressure on audit decision-making (Liu et al., 2022). At the same time, the auditor's personal characteristics and audit team cooperation significantly impact audit decision-making. The survey shows the influence of auditor experience and skepticism on audit judgment and the moderating effect of auditor identity. Experienced auditors have higher audit quality and more accurate audit judgments. In addition, skepticism can also improve the auditor's audit judgment. However, there are differences in the effects of auditor status on experience and skepticism.

### 3) Study on the influence of auditor's quality on innovation

The quality of auditors in auditing firms, including innovation ability, professional knowledge, and informatization technology expertise, positively impacts audit quality, client satisfaction, and financial reporting transparency and accuracy. In the research on the impact of the innovation ability of auditors of auditing firms on audit quality, it is proposed that auditors of auditing firms with higher innovation ability can improve audit quality and reduce the risk of audit errors, thereby improving the transparency and accuracy of the company's financial reports. Sex has a positive impact. In the study of the relationship between the professional knowledge of auditors in

auditing firms, compatibility with customers, and innovation capabilities (Ghosh & Moon, 2005), it is proposed that the professional knowledge and compatibility with customers of auditors in auditing firms can promote innovation, thereby improving Audit quality and customer satisfaction. Auditors of auditing firms with higher industry expertise can better understand and apply new technologies and methods, improving audit quality and efficiency. Therefore, the industry expertise of auditors in auditing firms has an impact on innovation. The research on the impact of auditors' informatization technology expertise on audit quality found that auditors with higher informatization technology expertise can better apply informatization technology tools and methods to improve audit quality and efficiency.

#### 4) Study on the influence of auditor's quality on audit quality

There is a positive correlation between the innovation ability of auditors of auditing firms and audit quality; that is, auditors of auditing firms with higher innovation ability can improve audit quality, thereby reducing the risk of audit errors and enhancing the accuracy and reliability of financial reports. The relationship among the industry expertise, client relationship, and audit quality of auditors in auditing firms. The findings suggest that auditors at auditing firms with higher industry expertise can better identify and resolve audit issues, thereby improving audit quality. In addition, a good relationship with clients can also promote audit quality (Teece, 2012). The relationship between auditors' industry expertise in auditing firms, corporate governance, and financial reporting quality. The findings suggest that auditors of auditing firms with higher industry expertise can better assess a company's financial reporting, thereby improving financial reporting quality. In addition, a good corporate governance structure can also promote the quality of financial reporting. Conducted a comprehensive review and analysis of the impact of the quality of auditors in auditing firms on audit quality (Sandelin, 2008). The quality of auditors in auditing firms, including professional knowledge, skills, judgment, and communication skills, has an essential impact on audit quality. Auditors with high-caliber audit firms are better able to identify and address.

### **2.5.4 The Impact of Quality of Auditors on Internal Control in Auditing**

#### **Firm**

Auditors possess a unique blend of specialized knowledge and skills that enables them to delve deeply into the business operations and internal control environment of the entities they audit. This deep expertise allows auditors to develop a more holistic and nuanced understanding of the organization's processes, equipping them to identify deficiencies and weaknesses in internal controls with greater precision and insight (Ghosh & Moon, 2005). By thoroughly understanding the intricacies of a client's business processes and the structure of their internal control system, auditors can evaluate the effectiveness of these controls with a higher degree of accuracy, allowing them to spot potential risks and issues that might otherwise go unnoticed.

This in-depth understanding stems from the auditors' familiarity with standard practices and the ability to apply their professional knowledge and experience to each client's context. Auditors are trained to critically analyze the internal control environment, looking beyond the surface to identify underlying problems and vulnerabilities (Teece, 2012). Their expertise enables them to perform a detailed examination of the internal control mechanisms, pinpointing specific areas where controls may be lacking or processes may not be as robust as required. With this comprehensive analysis, auditors can propose targeted and practical improvement measures. These recommendations are grounded in a deep understanding of the theoretical aspects of internal controls and the practical realities of the client's business (Ghosh & Moon, 2005). By addressing identified weaknesses and implementing suggested improvements, organizations can significantly enhance the strength and reliability of their internal controls.

This comprehensive understanding of the business and internal control environment enables auditors to design more focused and effective audit procedures. Tailored to the specific risks and challenges of the client, these procedures ensure that the audit is both thorough and precise, covering all relevant aspects of the organization's operations (Botzem & Quack, 2009). The result is a more accurate and reliable audit, which meets regulatory requirements and provides valuable insights to the client. Furthermore, enhancing auditors' professionalism and skills has a broader

impact on the overall quality of the audit. As auditors become more adept at identifying and addressing control weaknesses, the effectiveness of the internal controls within the audited entity improves. This, in turn, boosts the quality of the audit, as more robust controls lead to more reliable financial reporting and operational outcomes. Additionally, the client's trust in the audit process is strengthened when they see that the audit meets regulatory standards and contributes to improving their internal processes. Ultimately, by investing in the ongoing professional development of auditors, auditing firms can enhance their capacity to deliver high-quality audit services (Ghosh & Moon, 2005). This investment in skill and knowledge translates into more robust internal controls, more effective audits, and greater client satisfaction and trust. As a result, the firm's reputation for excellence is solidified, and its ability to attract and retain clients is enhanced, contributing to its long-term success and competitiveness in the industry.

## **2.6 Audit Quality**

### **2.6.1 Connotation of Audit Quality**

Scholars have explored the concept of audit quality from multiple angles, yet no universally accepted definition exists. DeAngelo (1981) defines audit quality as the probability that an auditor will detect and report a material misstatement, highlighting technical proficiency and ethical conduct. This perspective emphasizes the role of the auditor's independence and competence in ensuring high-quality audits. Simunic (1980) complements this by examining how audit quality is priced in the market, indicating that larger audit firms often deliver higher-quality audits due to economies of scale and expertise.

Furthermore, audit quality is linked to reducing information asymmetry between companies and stakeholders, ensuring that financial statements are reliable and transparent. Scholars like Knechel et al. (2013) have also expanded the concept by incorporating elements such as the audit process, the institutional environment, and auditor incentives, all of which affect the audit's outcome. Adopting technology, such as informatization, has further shaped the modern understanding of audit quality, with advanced tools improving accuracy and reducing omissions in financial reports.

Audit quality can be viewed as a multidimensional construct that depends on technical expertise, ethical standards, and institutional and technological factors that influence the auditing process. This study adopts DeAngelo's perspective.

### **2.6.2 Influencing Factors of Audit Quality**

From the connotation of audit quality, it can be known that it is intangible and can only be perceived as lacking a uniform and measurable standard. Researchers must analyze audit quality using substitution variables, which impacts the assessment of audit quality. Exploring the elements of audit quality reasonably (Huang et al., 2016) and comprehensively as possible is significant in enhancing the accuracy of its measurement and the desirability of standards. "Element" is "the necessary factors that constitute things." Related literature explains it as "a group of phenomena with common characteristics and relationships." For a classic perspective on audit quality, consider the foundational work by DeAngelo (1981), who defines audit quality as the joint probability that auditors discover a breach in the client's accounting system and report the breach. This classic study provides a theoretical underpinning for understanding audit quality and has been widely cited in subsequent research. Analyzing the constituent elements of audit quality is the basis of audit quality research, and the classification of elements of audit quality differs from different perspectives.

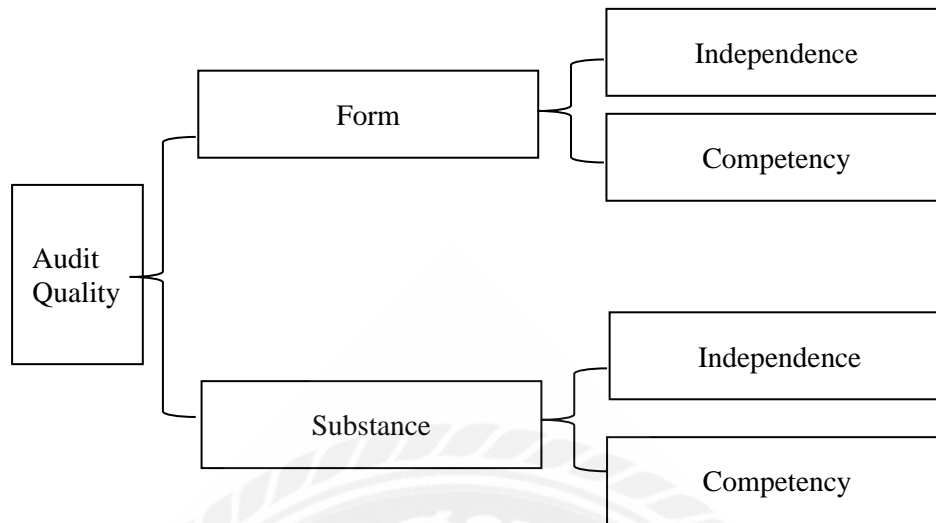
The essential elements of audit quality include auditor competence and independence, among which the size of an auditing firm reflects its formal independence and formal competence. It has better quality substitution. The firm's size is an ideal substitute indicator of audit quality (Teece, 2012), and it is believed that audit service is a kind of credit guarantee service, and only the size has the most signal effect of transmitting the credibility and quality of audit service. Afterward, scholars' research deepened the measurement and judgment of quality. Many scholars took the type of audit opinion, degree of earnings management, industry expertise, etc., as substitute factors for audit quality.

From the perspective of quality composition, the researchers proposed that the audit quality elements include two levels: the quality elements of individual audit businesses and the overall practice quality elements of auditing firms; the audit quality measurement system includes social expectation elements, public measurement

standards, professional standard elements (Baker et al., 2016), self-measurement standards, and legal standards—factor legal measure. Technical and independence elements are the essential elements of audit quality and are analyzed systematically and meticulously. Among them, technical elements include technical factors and economic factors. At the same time, the factors that affect the elements of independence mainly include "material factors," "spiritual factors," and "system factors" (Zan & Hong, 2012).

The current "Trial Implementation of Comprehensive Evaluation Measures for Auditing firms" issued by the CICPA has set comprehensive factor evaluation indicators and auxiliary factor indicators, such as total income, number of certified public accountants, training completion rate, number of leading talents in the industry, punishment, and punishment, etc. The comprehensive evaluation indicators include "number of branches," "number of employees," "number of partners and shareholders," "age structure of CPAs," "study structure of CPAs," and other auxiliary indicators.

Audit quality shows two aspects, formal and actual elements, and confuses people's understanding (see **Figure 2.4**). " Formal audit quality substitute indicators include firm reputation, size, whether to provide non-audit services to the same audit client, whether to the behavior of soliciting customers at low prices and the objective audit quality substitute indicators include the legal responsibility of the auditors, the professional expertise of the auditing firm, and whether the quality control of the auditing firm is strict. This does not mean the results are consistent with objective conditions of the substantive factors (Halkos & Tzeremes, 2007). Large firms do not necessarily have high quality, and small firms do not necessarily have poor audit quality. Independence is the soul of audit quality elements. Audit quality is mainly affected by formal independence elements and actual independence elements. Both formal audit elements and real audit elements include two main elements: independence and competence.



**Figure 2.4** Components of Audit Quality

(Source: CICPA, 2006)

From the above points of view, the determination of audit quality elements is still a controversial issue. Although there are different opinions, each has strengths and is reasonable from a certain point of view. Chinese scholars focus on the target elements of the practice process but ignore the actual assessment elements of the auditor's assurance level ability. Although the quality element design of the CICPA pays attention to the auditor's actual execution ability, it has separated the link between the process and the result of the audit quality element, which is one-sided. Some scholars pay attention to the relationship between external and internal elements of audit quality but also lack specific consideration and subdivision of audit quality process and result elements. More importantly, researchers lack empirical support for determining audit quality elements.

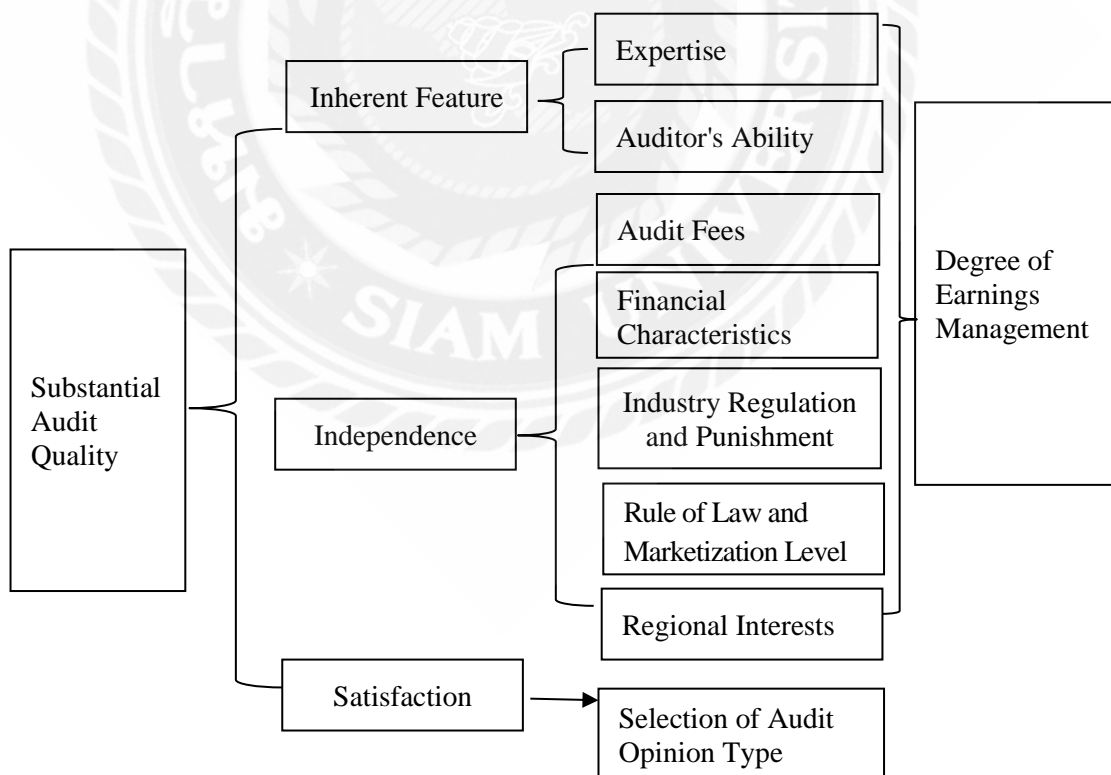
For the study of audit elements, the British Financial Reporting Council, also known as the research, is at the forefront of the world. After conducting primary research and discussions in 2006, the audit quality framework officially released in February 2008 covers all elements of audit quality. Such as firm culture, professional skills and personal qualities of partners and employees, effectiveness of audit process, reliability and validity of audit report, and uncontrollable factors affecting audit quality. This approach supports the audit system view. Therefore, auditing is a service process; audit opinion is only a work result, and the process and result are dialectically unified.



Secondly, the audit quality needs to reflect the degree of satisfaction with the needs of the information stakeholders and the assurance level of the audit process regarding the quality requirements. The work results can accurately reflect the audited entity's financial and operating status. Earnings management can be effectively controlled during the work process. These situations can be discovered and reported so that within effective supervision (Dai & Vasarhelyi, 2017), the perceived quality in form is consistent with the actual quality. The quality of consumption has developed consistently.

Finally, audit quality depends on the inherent quality characteristics of auditors, auditing firms, and clients of the audited unit. Whether auditors implement relevant regulations in established auditing standards and standards makes quality requirements more effective under the influence of the legal system and the environment. It can be seen that it is not advisable to treat audit quality in isolation.

### 2.6.3 Audit Quality Attributes



**Figure 2.5** Composition of Audit Quality Attributes

(Source: CIPA, 2006; DeAngelo, 1981)

The "Composition of Audit Quality Attributes" figure illustrates the interaction of various factors that collectively determine substantial audit quality (see **Figure 2.5**). The core elements influencing audit quality are inherent features, independence, and satisfaction. Inherent features include the auditor's expertise, ability, audit fees, financial characteristics, and the broader regulatory environment. These factors are essential for shaping the audit process. DeAngelo (1981) emphasizes the importance of auditor competence in maintaining high-quality audits, as larger audit firms with more resources tend to deliver more thorough results. Similarly, audit fees and the financial characteristics of the firm impact the audit, where higher fees can influence the auditor's objectivity (Simunic, 1980). Additionally, industry regulations, punishments for non-compliance, and the degree of earnings management require auditors to exercise heightened professional skepticism to detect potential manipulations.

Auditor independence is another critical element, ensuring objectivity and freedom from client influence. Knechel et al. (2013) highlight that auditor independence helps protect the reliability of the audit process, reducing the risk of biased reporting. Meanwhile, satisfaction refers to how well audit services meet stakeholders' expectations, impacting their perception of audit quality. While satisfaction is essential, auditors must uphold rigorous standards to ensure reliable financial reporting. In combination, these factors—auditor expertise, independence, regulatory frameworks, and stakeholder satisfaction—form the foundation for ensuring substantial audit quality, providing an accurate and fair assessment of a company's financial standing.

The influence of audit independence is related to the internal control mechanism, organizational mode, and the relationship with listed companies. Considering that the research in this paper is based on the level of auditing firms, the internal governance mechanism between auditing firms and auditors has not been further studied, especially the impact of auditing firms on auditor independence. In addition, considering that most of the organization forms of Chinese auditing firms are limited liability systems and the scope of the research samples, this article does not consider the organization form and internal governance factors (Pittman et al., 2024).

Larger firms have higher audit quality, which may be because larger firms can provide more resources and expertise, thereby improving audit quality. There is a positive correlation between audit firm report conservatism and audit quality (Li, 2022; Weber & Willenborg, 2003). Auditor firms that pay more attention to and are more cautious about potential risks in the company's financial reports can improve audit quality. The impact of auditing firms providing consulting services on audit independence and audit quality. The provision of consulting services by auditing firms may reduce audit independence, thereby reducing audit quality. Auditing firms with a longer audit period are more prone to audit report errors because the relationship between the audit firm and the client may affect the degree of attention of the auditor firm to the potential risks in the company's financial report, thereby affecting the audit quality.

#### **2.6.4 Related Research on Audit Quality**

##### **1) Audit quality and internal control**

The existing literature studies the relationship between internal governance and audit quality and believes that internal governance has an essential impact on audit quality; whether it is the firm's management structure or the employee management system, it will indirectly affect audit quality.

From the overall situation, in the firm's internal governance, the firm's organizational form, ownership structure, high-level management committee, salary promotion system, and the firm's informatization disclosure as a whole will affect the audit quality control, which provides an important supporting role for the audit team to ensure the quality of audit work. For state-owned enterprises, attention has been paid to both the governance structure of the firm and the management structure of the audited unit so as to improve the audit quality. Moreover, because the informatization held by the firm plays an essential role in the capital market, the firm should also pay attention to the issue of informatization disclosure in the capital market, which can also improve audit quality. Scholars believe that auditors work in a high-intensity and high-pressure environment all year round, and their work status and emotions will more or less affect the audit quality. However, a good institutional environment in the firm will help auditors relieve work pressure and reduce negative influence.

From the point of view of integration, the integrated management of auditing firms helps to effectively allocate internal resources and control the quality of audit work. To some extent, the business growth of branch offices is based on the premise of sacrificing part of the audit quality. Further research shows that this phenomenon is powerful in many firms that have not implemented integrated management or that integrated management has shown poor results. At the same time, in some areas with high customer concentration, the side effects of such a negative correlation will be more obvious. A significant element of internal governance is constructing relevant systems (Behbahaninia, 2024; Weber & Willenborg, 2003).

## 2) Quality of auditors and audit quality

For auditing firms, human capital is the most essential part of their capital components, and it has a particular relationship with audit quality. In general, the optimization of human resources can improve audit quality. There is a positive correlation between auditing firms' human capital development layout and their business performance. It is mainly reflected in three situations. First, the higher the level of education of the firm's employees, the higher their salary level and the improvement of the firm's business performance. The business performance of the firm will also increase; thirdly, the higher the employees' demands on themselves, the more they will invest in self-improvement, the more positive the salary measurement will be (Opresnik & Taisch, 2015), and the firm's performance will also have a certain degree of improvement.

From the perspective of training and promotion, full-time training plays a vital role in transforming and forming a company's human capital, and relevant training can help enterprises form targeted human resources. Later, scholars also carried out more extensive research based on this conclusion. Losing specialized human capital will threaten the firm's competition in the capital market (Cheng et al., 2009). Therefore, the combination of access rights and human capital, through the rational allocation of resources, partner promotion incentives, and dismissal system, helps to allocate human capital in the most targeted manner and, simultaneously, screen out employees with low conversion levels and improve human resources. Use efficiency and ultimately improve audit quality. After further research, the firm's appropriate promotion incentive system

can better motivate auditors to improve themselves. Relevant studies have shown that auditors with strong learning abilities often have higher requirements for themselves and the need for self-realization. Therefore, the promotion system can be better utilized for auditors with high learning abilities—incentives to improve audit quality. At the same time, for higher-level knowledge-absorbing auditors, a suitable promotion system can form a more significant attraction so that such auditors are willing to serve the firm better and retain the knowledge they have digested and absorbed to the greatest extent.

### 3) Informatization and audit quality

With the advent of big data, IT can be applied in a broader range. Existing research shows that firms' scientific and technological resources can improve audit efficiency, save time and cost, and improve audit quality. As far as the relationship between big data and audit quality is concerned, big data can be applied to audit work, thereby improving the efficiency and effectiveness of financial statement auditing. Big data can improve audit quality, but the informatization leakage caused by too transparent data cannot be ignored. This requires auditing firms to strengthen the quality of employees and maintain informatization technology security while using big data. The big data environment uses the developed structure and logic when carrying out audit activities. According to the evaluation of the application effect of big data audits in some regions, it is found that big data can be applied to specific audit projects and help audits build a quality system (Clarkson, 1995).

In the context of big data, the authenticity and reliability of financial data, the rationality of informatization system implantation, and how to establish a firewall for the acquired data to ensure informatization security are all things that need to be considered in maintaining and improving audit quality problems (Anderson et al., 2004). At the same time, background assistance based on big data helps improve the accounting informatization system. Big data helps to update financial data on time, which can improve the work efficiency of auditors. Therefore, in the era of big data, firms should make full use of data advantages, establish a powerful informatization protection platform and analysis platform, formulate more targeted audit strategies, and ensure the improvement of audit quality. There is also a particular relationship between artificial intelligence and audit quality. Artificial intelligence can have an impact on

audit quality, and the impact is more significant in auditing firms. The audit robot is essentially a product of automation engineering. Applying RPA to the development of the audit robot program can effectively solve the problems of high error rate during the execution of the preliminary analysis program, scattered data that is difficult to collect (Han, 2021), and time-consuming and labor-intensive problems. Subsequent audit work saves a lot of time and human capital, thereby helping to improve audit quality.

#### 4) Knowledge resources and audit quality

At present, most scholars believe that the renewal and utilization of knowledge resources can not only enhance the knowledge and experience reserves of the firm but also become an essential asset of the firm in future audit work. As a professional organization, auditing firms are professionally intensive (Teece, 2012) and have more prosperous and stricter requirements for professional knowledge. Based on the source of knowledge, the firm's knowledge resources are divided into two parts: internal and external. After acquiring relevant knowledge, internal resources include knowledge sharing and diffusion, and external resources include knowledge spillover and knowledge growth. Knowledge sharing is mainly aimed at internal sharing: knowledge diffusion represents external circulation: knowledge spillover, more inclined to knowledge integration, knowledge between non-audit business and audit business can actually be shared and diffused to achieve the purpose of "spillover," or Knowledge exchange can also be formed between the firm and the management team of the audited client; the purpose of knowledge growth is to disclose part of the knowledge held by the firm to the public society in an appropriate manner. The intercommunication between them can enhance practitioners' independence, improve the comprehensibility of the firm's internal audit quality control system, and ultimately improve the audit quality (Doyle et al., 2007).

At the same time, regarding the element of knowledge spillover, under the knowledge spillover effect, there is also a phenomenon of interoperability among various departments within the firm concerning the informatization that the company has obtained, especially non-audit departments can also obtain informatization. As long as it can be used reasonably and supervision is enhanced, non-audit businesses can promote increased audit quality. Audit knowledge, as a hidden resource, can only

realize its capital value by embedding in audit work through continuous acquisition, absorption, integration, and output (Chen et al., 2014).

## **2.7 The Moderating Effect of Organization Size on The Relationship Between Informatization and Internal Control**

The moderating effect of organization size on the relationship between the quality of auditors and internal control is mainly reflected in resource allocation, independence, complexity, governance mechanisms, and control needs (Chen et al., 2014). Auditing firms with large organization sizes have higher complexity and control needs, and the quality of auditors plays a more critical role in the effectiveness of internal control (Ji et al., 2016). Auditing firms with large organization sizes can attract high-quality auditors and allocate more resources for internal control (Doyle et al., 2007), thereby improving the overall control level. Some scholars have studied the impact of the quality of auditors on financial reporting and examined the moderating effect of organization size (Chen et al., 2014; Qi, 2020). The professional ability and independence of auditors have a more substantial impact on the accuracy of financial reporting and the effectiveness of internal control. The moderating effect of organization size is more significant in the impact of governance mechanisms and audit quality on internal control (Sterin, 2020).

Through research, it is found that large auditing firms surpass auditing firms with smaller organization sizes in terms of resources, capabilities, organizational structure, informatization investment, informatization maturity, and the depth of integration between informatization and internal control (Jeppesen, 2007; Lamboglia & Mancini, 2021). Larger organizations are more likely to adopt new technologies and informatization systems, thereby better supporting, improving, and implementing internal controls. Large auditing firms have complex internal controls and high administrative intensity, requiring more powerful informatization to achieve internal management. Large firms need more complex internal controls to manage more business processes and personnel, which prompts them to rely on advanced informatization to improve control efficiency. On the other hand, large auditing firms have more resources and experience to implement complex informatization, which can

more effectively support internal control activities (Jeppesen, 2007; Lamboglia & Mancini, 2021).

Medium firms have a higher return on investment in informatization because they can better use informatization systems to optimize internal controls and business processes. Improving internal controls is more apparent, and the supporting role of informatization on internal controls is more prominent in these auditing firms (Chen et al., 2014; Sterin, 2020). Organization size significantly moderates the relationship between informatization and internal control (Waresul et al., 2013).

Chen et al. (2022) study that smaller firms tend to adopt more straightforward informatization tools that are easier to manage and maintain but might not offer the comprehensive features of the systems used by larger firms. This can impact the quality of internal controls, as more sophisticated systems provide better data accuracy, security, and process automation. Additionally, small firms might struggle to attract and retain highly skilled auditors due to budget constraints, leading to reliance on less experienced auditors, which can compromise audit quality. Zhou et al. (2020) found that smaller firms often employ auditors with broader but less deep expertise, affecting the thoroughness and accuracy of audits. However, the flexibility and responsiveness of small firms allow them to quickly adapt to regulatory changes and client needs, partially offsetting these disadvantages.

## **2.8 The Moderating Effect of Organization Size on The Relationship Between Quality of Auditors and Internal Control**

The moderating effect of organizational size on the relationship between the quality of auditors and the effectiveness of internal control manifests in several key areas, including resource allocation, auditor independence, organizational complexity, governance mechanisms, and the specific control needs of the firm (Chin & Chi, 2009). Due to their greater size, larger firms tend to operate with higher levels of complexity and more extensive control requirements, making the quality of auditors a crucial factor in ensuring the effectiveness of internal controls (Chen et al., 2022). The significant role that auditor quality plays in such firms is not just a matter of technical proficiency but also reflects the ability of these large firms to attract and retain top-tier auditing



professionals. These high-quality auditors, in turn, are better equipped to address the multifaceted challenges of larger and more complex organizational structures (Whitworth & Lambert, 2014).

Larger firms are also more likely to have the financial and human resources necessary to support robust internal control systems (Martínez-Ferrero et al., 2018). This ability to allocate substantial resources for internal control activities enables these firms to implement more sophisticated and effective control measures, thereby enhancing the overall quality of internal controls (Flynn et al., 1994). The presence of high-quality auditors within these firms amplifies this effect, as their expertise and experience allow them to utilize these resources effectively, ensuring that internal controls are not only adequately designed but also correctly implemented and monitored (Botzem & Quack, 2009).

Furthermore, auditors' professional abilities and independence are critical in maintaining the accuracy of financial reporting and the effectiveness of internal controls (Guenther et al., 2016). In larger organizations, where financial operations and internal processes are more complex, the auditors' ability to remain independent and exercise sound professional judgment is paramount. The impact of auditor quality on financial reporting accuracy is, therefore, magnified in larger firms, where errors or weaknesses in internal controls can have more significant consequences (Sari et al., 2019).

Several scholars have explored the impact of auditor quality on financial reporting and have specifically examined how the size of an organization can moderate this relationship (Muliawan & Sujana, 2017). Their research has shown that auditors' professional capabilities and independence have a more pronounced effect on the accuracy of financial reporting and the robustness of internal controls in larger firms (Trkman, 2010). This is because larger firms face more complex governance challenges and have more significant stakes in ensuring that their financial reporting is accurate and that their internal controls are adequate (Ghosh & Moon, 2005). The moderating effect of organization size is particularly evident in the influence of governance mechanisms and audit quality on internal controls. Larger organizations typically have more elaborate governance structures, which require a higher level of oversight and more stringent controls. In such settings, the quality of auditors becomes even more

crucial, as their role in assessing and enhancing these controls is directly tied to the overall effectiveness of the organization's governance. High-quality auditors in large firms are better positioned to navigate these complexities, providing insights and recommendations that help to strengthen governance and improve control systems.

In summary, the size of an organization plays a significant moderating role in the relationship between auditor quality and internal control effectiveness. With their greater complexity and control needs, larger firms benefit more from high-quality auditors who can effectively allocate resources, maintain independence, and address the intricate challenges of governance and internal control. This relationship underscores the importance of investing in auditor quality, particularly in large organizations where the stakes are higher, and the impact of adequate internal controls is more critical to the firm's success.

## **2.9 The Impact of Principal-Agent Theory on Audit Quality**

### **2.9.1 Principal-Agent Theory**

American economists first proposed the principal-agent theory (Fama & Jensen, 1983). They argued that when the principal entrusts the agent to perform tasks on their behalf, issues such as information asymmetry, conflicts of interest, and risk sharing arise. These issues may lead the agent to prioritize their interests over those of the principal, potentially harming the principal's interests. Over time, as the theory evolved and expanded, the scope of research and its applications broadened, as demonstrated in **Table 2.4**. The agency relationship between the principal and the agent remains the core of principal-agent theory, focusing on how these dynamics affect decision-making and governance structures.

**Table 2.4** Development of Principal-Agent Theory

Scholar	Year	Main Contribution
Eugene F. Fama & Michael C. Jensen	1983	Expanded agency theory to corporate governance, emphasizing the importance of the separation of ownership and control and the role of internal and external control mechanisms.
Sanford J. Grossman & Oliver D. Hart	1983	Focused on the role of incomplete contracts in agency relationships, where principals cannot fully specify agent behavior in advance.
Bengt Holmström	1979	Analyzed moral hazard in agency relationships, exploring the consequences when the agent's behavior is misaligned with the principal's interests.
Andrei Shleifer & Robert W. Vishny	1997	Applied principal-agent theory to corporate governance, analyzing managers' role as shareholders' agents.
Robert Gibbons and John Roberts	2013	Explored the application of agency theory in organizational design, highlighting how organizational structure influences agent incentives and control.
Jean Tirole	2017	This paper expands on incentive theory further, focusing on how governance structures ensure agents act in alignment with broader societal and stakeholder interests.
Donald A. Bosse & Robert A. Phillips	2020	The concept of "reciprocal fairness" was developed, showing that agents are more likely to act in the principal's interest when they perceive fair treatment from the principal.
Eugene F. Fama & Michael C. Jensen	2022	Advanced the discussion on risk-sharing contracts, suggesting modern firms should incorporate risk asymmetry considerations into principal-agent frameworks.

Note: Collected and organized by the researcher.

The principal-agent theory has evolved significantly. Early contributions focused on foundational concepts like information asymmetry and agency costs. Over time, the theory has expanded to address complex organizational dynamics, incentive structures, and corporate governance challenges. Recent developments have introduced more nuanced views, including power dynamics, fairness, and the role of governance in aligning broader

societal interests.

### **2.9.2 The Impact of External Oversight Functions on Audit Quality Based on the Principal-Agent Relationship**

To establish a normative social order, the government must rely on a system that reflects the country's history, balances different forces and international agents, and solves problems through different perspectives and informatization. Safdar et al. (2019) studied how changes in China's legal and regulatory frameworks affected the relationship between client economic importance and audit quality, concluding that the likelihood of issuing modified audit opinions at the CPA level is negatively related to client importance. When the institutional environment becomes more investor-friendly, issuing an audit opinion positively relates to client importance. Research by Behbahaninia (2024) has shown that when the regulatory system (including social and governmental systems) is effective, it significantly improves audit quality. Improving regulatory systems enhances CPAs' risk awareness and the oversight of informatization users, which, in turn, improves audit quality.

Lennox and Wu (2022) argue that government accounting oversight can be understood in both narrow and broad senses. In the narrow sense, it refers to financial departments' oversight, while the broad sense includes national audit agencies, tax agencies, central banks, industry association management agencies, and securities regulatory commissions. This paper adopts a general scope of multi-department government supervision. Combined media supervision and governance effects with government oversight to conduct research, concluding that the quality of government oversight significantly impacts the media's supervisory and governance effects. In regions where regulatory quality is insufficient, the effectiveness of media oversight in stabilizing audit contracts between auditees and auditing firms is seriously weakened. Liu (2020) suggests that the public goods attribute of accounting informatization can easily lead to market failure, affecting traders' economic outcomes and leading to government oversight intervention. Rational accounting oversight ensures that the capital market provides sufficient informatization. The government holds a relatively independent and authoritative position, with the ability to impose sanctions on lawbreakers. Therefore, compared to other supervisors, the government has more significant advantages as an accounting supervisor.

DeAngelo (1981), focusing on the penalties imposed by regulatory bodies, found that firm size affects the impact of administrative penalties. After being subject to administrative penalties, larger firms see a smaller improvement in audit quality than smaller ones. Research conducted by Francis (2011) indicates that government auditing promotes the high-quality development of enterprises. Further research found that when enterprise development quality is higher, government auditing has a more significant effect on promoting high-quality enterprise growth. Moreover, the greater the intensity of government auditing, the more it contributes to high-quality enterprise development.

### **2.9.3 The Impact of Client Media Supervision on Audit Quality Based on The Principal-Agent Relationship.**

Liu et al. (2013) selected several listed companies from 2001 to 2009 for analysis. Their analysis found that as the number of negative media reports about Auditee increases, the audit contract relationship between Auditee and auditing firms becomes more unstable and more likely to change; moreover, the possibility of change is closely related to the level of litigation risk. The lower the risk, the better the stability of the contract with the auditing firm. However, when CPAs face higher litigation risks, the impact of negative media reports on auditing firm changes will become more prominent. At the same time, it was further found that under the high risk of litigation, negative reports from authoritative newspapers and periodicals exacerbated the instability of the contract between Auditee and auditing firms. Based on the former research, Chinese scholars proposed that there is a specific connection between media supervision, government intervention, and independent audit quality. The impact of positive media reports on audit quality is not apparent. In contrast, the agenda setting of negative media reports can alleviate the earnings manipulation behavior of listed companies and help improve the audit quality of auditors. The influence of external supervision mechanisms can reduce the Auditee's earnings manipulation behavior by implementing auditor changes and improving audit quality. Chinese scholars' Empirical research shows that annual report inquiry supervision can improve audit quality (Lennox & Wu 2022). Chinese scholars showed through empirical research that the media's supervision mechanism for auditing firms is less effective when subject to administrative intervention by local governments. (1) Negative media reports will have a more obvious promoting effect on improving audit quality; (2) Positive media reports have a weak relationship with audit

quality. (3) The development of the media environment has a more prominent role in promoting the performance of the media supervision mechanism. In areas with a higher degree of informatization, the more pronounced the positive impact of negative media reports on CPA work, the more conducive to improving audit quality.

#### **2.9.4 The Impact of Client Size on Audit Quality Through Principal-Agent Relationships**

Auditing firms in China are divided into the "Big Four International" and the "Big Four Non-International." The revenue of the "Big Four" auditing firms occupies a decisive position among the top 100 firms in China. Based on 2022 data, "Big Four" auditing firms accounted for 38.15 %, and the other 96 auditing firms accounted for 61.47%. Customers also vary in size, usually divided into three categories: large, medium, and small. The size of customer assets is one of the critical indicators of audit fees. Cai (2020) researched and analyzed China's listed companies in Hong Kong. Auditing firms, especially those with relatively large scale, due to reputation and risk considerations, are entrusted by large-scale clients, and the independent relationship will be higher and affect the audit quality. However, some analysis proves that when a large client accounts for most of the auditing firm's revenue, the auditing firm may sacrifice independence in order to retain this vital client, thereby affecting audit quality. The traditional view emphasizes the negative impact of significant customer dependence on customer business risks. However, Krishnan et al. (2019) found that suppliers with more concentrated customer bases spend less on audit fees, and audit fee discounts do not mean that audit quality increases with a decline due to a decline in customer concentration. Chinese scholars found that customer influence does not force auditing firms to make concessions on audit quality in the industry. In order to avoid the reputational damage, economic losses, and litigation risks that may be caused by audit failure, auditing auditors are motivated to provide high-quality audit services to high-impact clients.

Priyanka and Dewi (2019) studied Indonesian listed companies from 2012 to 2017 and found that client size positively and significantly impacts audit quality. Liu (2020) empirically analyzed the data of China's listed companies and their major auditing firms from 2015 to 2017. They concluded that there is a significant negative correlation between customer importance and audit quality. Kabir et al. (2022) examined the relationship between internal control and audit quality, emphasizing the moderating effect of the principal-agent

relationship. They found that internal control mechanisms are crucial in ensuring high audit quality, and the dynamics of the principal-agent relationship significantly influence this process.

### **2.9.5 The Impact of Regulating Internal Control and Audit Quality of Auditing Firms Based on The Principal-Agent Relationships**

The principal-agent relationship plays a significant role in shaping internal control mechanisms and audit quality. This relationship exists between principals (shareholders and other stakeholders) and agents (managers or auditors) and involves the government and the General public. As a regulator, the government represents the interests of the public, ensuring that businesses and auditing firms comply with laws and regulations, thus safeguarding public interests (Eisenhardt, 1989). At the same time, the public relies on the fairness and accuracy of audit reports, expecting that audits will reduce information asymmetry in financial reporting. These external agents complicate principal-agent problems, requiring auditors to be accountable to shareholders and consider broader social responsibilities and government regulatory requirements.

The impact of principal-agent relationships on the connection between internal control and audit quality has received increasing attention. Carcello and Nagy (2004) found that in environments where agency problems are more pronounced, the relationship between internal control strength and audit quality tends to weaken because auditors may be more susceptible to management pressure or client relationships. This highlights the importance of strong governance and oversight systems to ensure that the interests of auditors (agents) align with those of stakeholders (principals), thereby safeguarding audit quality. Wang et al. (2021), using data from A-share listed companies in China, analyzed how principal-agent problems in different ownership structures affect the effectiveness of internal control. The study revealed that agency issues are more pronounced in state-owned enterprises in China, where the government serves as the primary shareholder. While internal control systems are robust, their role in improving audit quality is relatively weak. In contrast, in China's private enterprises, where shareholders provide direct oversight, internal control mechanisms are more flexible and effective, resulting in higher audit quality.

Li and Zhang (2022) analyzed changes in corporate governance structures and regulatory environments in China to explore the impact of the government and the public as

external agents on audit quality. The study pointed out that with the Chinese government's increasing emphasis on financial transparency and corporate compliance, particularly following the "Basic Standards for Enterprise Internal Control," the positive correlation between internal control and audit quality has strengthened. However, the research also found that when company management can exert influence over auditors, especially in the absence of external solid regulatory oversight, the effectiveness of internal control is diminished, leading to a decline in audit quality. Liu et al. (2023), based on research in China's capital markets, further confirmed the moderating role of the complex principal-agent relationship on the connection between internal control and audit quality. The study found that when a company's level of social responsibility is high, the oversight role of the public and other external stakeholders becomes more significant, helping to mitigate agency problems and enhance the effectiveness of internal control, thereby improving audit quality. In companies with higher environmental and social responsibility disclosure levels, auditors are more motivated to maintain independence, thus ensuring audit quality.

### **2.10 Internal Control Mediates the Relationship Between Quality of Auditors and Audit Quality of Auditing Firm**

The quality of auditors significantly influences the overall audit quality of auditing firms. High-quality auditors are generally more experienced, possess better professional knowledge, and are more adept at identifying and mitigating risks during the audit process. However, the relationship between auditor and audit quality is not always direct. Internal control mechanisms within auditing firms serve as a mediating factor that can enhance or weaken this relationship (Chen et al., 2020). Internal control systems ensure that the skills and expertise of high-quality auditors are effectively utilized, ultimately leading to improved audit outcomes. The mediating effect refers to a third variable (the mediator) that explains the relationship between two other variables. In this context, auditor quality (the independent variable) influences audit quality (the dependent variable), while internal control plays the role of the mediator (Baron & Kenny, 1986). Internal control systems act as an intermediary, ensuring auditors' competencies and knowledge are applied within a structured and regulated framework, enhancing audit reliability and performance (Sun et al., 2021). Auditor industry expertise is complex, so empirical researchers use indirect proxy variables to measure



expertise. Taylor (2000) conducted experiments to examine the differences in audit risk assessments between non-specialist and industry-specialist CPAs. The results showed significant differences in revenue risk assessments but minimal differences in inherent risk assessments for property and equipment accounts.

High-quality auditors with strong educational backgrounds, technical skills, and professional experience can significantly improve audit quality. However, without a robust internal control system, even experienced auditors may face challenges ensuring consistent audit performance. Internal control systems help structure audit tasks, monitor compliance, and provide a standardized framework that guides auditors in their work, ensuring that the potential benefits of having high-quality auditors are fully realized (Li & Zhang, 2022). These control systems also offer real-time data validation, error checking, and risk assessment, contributing to audit quality. High-quality auditors are better equipped to detect irregularities, make informed decisions, and provide more accurate audit reports in a sound internal control environment. Chi and Chin (2011), using a sample of Taiwanese listed companies, found a negative correlation between the expertise of CPAs from Taiwan's Big Four auditing firms and audit risk. Li (2022) found that office-level industry specialization, office size, and office reputation were positively correlated with internal control audit quality, with results validated through robustness checks.

Several studies emphasize the importance of internal control as a mediating factor between auditor quality and audit quality. For example, Han (2021) demonstrated that internal control systems ensure that auditors' expertise and skills translate into higher audit quality. Without internal controls, even highly skilled auditors may fail to consistently achieve high-quality audit outcomes due to a lack of proper oversight, inadequate procedural frameworks, or insufficient risk management protocols. Sun et al. (2021) further supported this by showing that firms with more robust internal controls experienced more significant improvements in audit quality when employing higher-quality auditors. Their research suggests that while the individual abilities of auditors are essential, the internal structures and processes of the auditing firm are equally critical in ensuring consistent audit performance. In essence, internal control serves as a conduit through which the expertise of auditors can be effectively utilized to improve audit quality. Carcello and Nagy (2004) noted that industry knowledge leads to higher audit quality, with evidence showing that auditing firms increasingly prioritize industry specialization, which may be attributed to the industry

expertise held by audit teams or firms. Song et al. (2017) examined the relationship between CPA industry specialization and fraudulent financial reporting. They found that fraud occurred less frequently when CPAs were industry experts, using continuous and binary specialization measures to calculate market share and assess industry specialization.

Although high-quality auditors are better at identifying risks and ensuring compliance, internal control systems are essential for mitigating risks that may arise from human error, lack of oversight, or process inefficiencies. Even the best auditors can make mistakes or overlook important details without proper control measures (Li & Zhang, 2022). Internal controls act as a safety net, helping to identify and correct such errors in real-time, ensuring the accuracy and reliability of audit results. Internal control systems provide auditors with the tools and frameworks needed to apply their expertise across different audit engagements consistently. For instance, internal control systems ensure compliance with industry regulations, set procedures for risk assessment, and establish guidelines for reviewing and validating audit data. These frameworks help reduce the risks associated with audit variability, even when auditor quality is high (Han, 2021).

In this context, the quality of auditors serves as the independent variable, influencing audit quality (the dependent variable), while internal control plays the mediating variable. This research focuses on the relationship between auditor expertise and audit quality, specifically how internal control mechanisms within audit firms enhance or inhibit the effectiveness of high-quality auditors. Industry specialization among auditors has emerged as a significant factor, as previous studies have shown its impact on risk assessment, fraud detection, and audit quality. Additionally, this study illustrates how industry-specific knowledge and auditor expertise can enhance audit outcomes when combined with a robust internal control framework. As the audit industry continues to evolve, with an increasing emphasis on industry expertise and specialization, audit firms must not only focus on hiring highly qualified auditors but also invest in strengthening internal control systems. In this ever-evolving environment, auditors need to expand their professional knowledge and refine their audit practices, particularly by integrating deeper industry insights and improving internal processes to leverage their expertise to improve audit quality fully.

### **2.11 Internal Control Mediates the Relationship Between Informatization and Audit Quality of Auditing Firm**

Internal control systems ensure that the benefits brought by informatization are realized by addressing the risks and challenges posed by new technologies, ultimately improving audit quality (Sun et al., 2021). Auditing processes have undergone fundamental changes with the rapid development of informatization in audit firms. Audit firms are increasingly adopting big data analytics, AI, and cloud computing to improve efficiency, reduce errors, and provide more comprehensive data analysis (Chen et al., 2020). However, informatization itself does not necessarily directly enhance audit quality. Although the direct impact of informatization on audit quality is widely acknowledged, the internal control systems of audit firms serve as an important mediating factor, which can amplify and safeguard the benefits of informatization.

Informatization has introduced new complexities to audit processes, particularly concerning data security, information integrity, and compliance (Li & Zhang, 2022). Advanced information systems can enhance data processing efficiency, reduce human error, and introduce potential vulnerabilities, such as system failures or data breaches. Internal control mechanisms play a crucial role in mitigating these risks. They implement protective measures and protocols to ensure audit data's accuracy, reliability, and security. For example, Han (2021) found that companies with robust internal control systems can better leverage the potential of informatization technologies, thus improving audit quality. By embedding real-time monitoring, data validation, and risk management procedures into the firm's internal control framework, auditors can ensure that the complexities introduced by informatization do not compromise the reliability and accuracy of the audit. Without these control measures, informatization could introduce operational risks, undermine the integrity of the audit process, and reduce audit quality.

Several empirical studies have validated the mediating role of internal control in the relationship between informatization and audit quality. Han (2021) used SEM to investigate how internal control mediates the impact of informatization on audit quality. Their findings revealed that informatization does not significantly improve audit quality unless accompanied by effective internal control measures. Similarly, Sun et al. (2021) supported this view, emphasizing that companies with more complex internal control systems

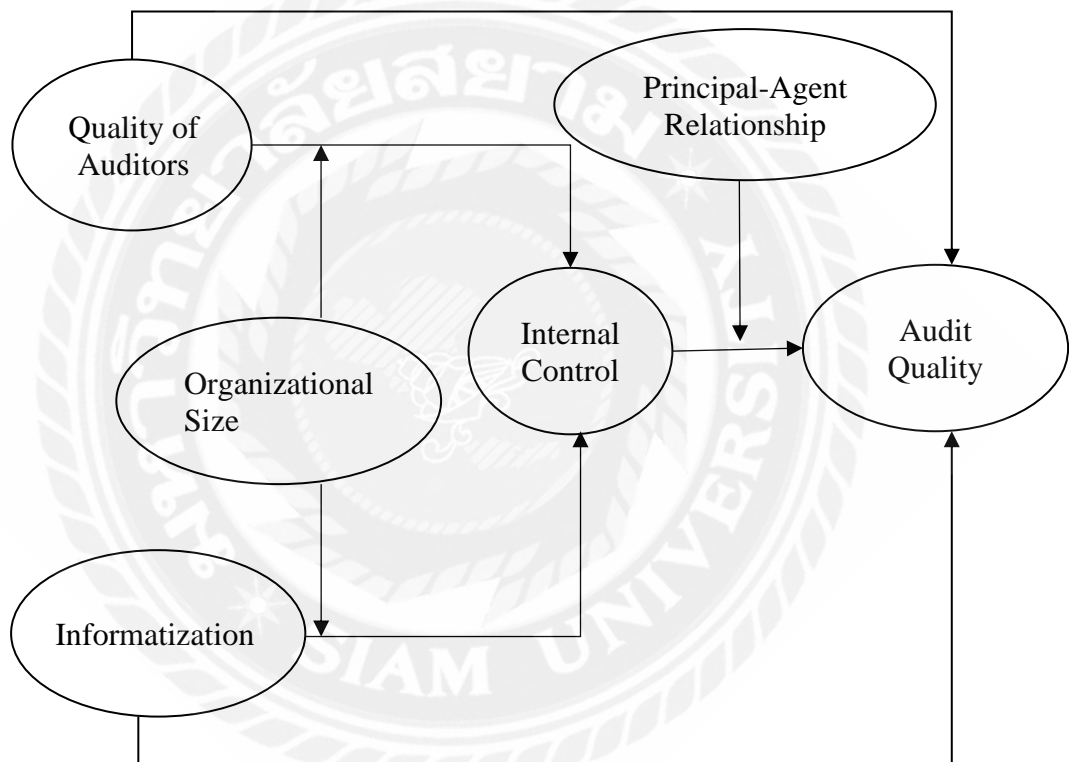
experienced significantly more significant improvements in audit quality when adopting new technologies than firms with weaker controls. These studies underscore the importance of robust internal control systems in ensuring that informatization leads to the expected improvements in audit quality. Specifically, they demonstrate that internal control bridges informatization and audit quality, effectively connecting the efficiency gains brought by new technologies with the reliability and accuracy required in the audit process.

Although informatization has the potential to improve audit efficiency and accuracy, it also introduces new risks that, if not properly managed, could compromise audit quality. For example, reliance on automated systems may expose firms to operational risks such as system failures or cyberattacks (Li & Zhang, 2022). Internal control systems are essential for monitoring these risks and implementing real-time corrective measures. This is particularly important in an environment where regulatory scrutiny and compliance requirements are becoming increasingly stringent. Firms that fail to establish robust internal control frameworks may find that the risks introduced by informatization outweigh its potential benefits. Moreover, effective internal control helps ensure that audit procedures remain compliant with industry regulations and standards, even when adopting new technologies. By maintaining rigorous checks and balances, internal control prevents data misuse or misinterpretation, ensuring audit reports' accuracy and fairness (Han, 2021). This compliance further strengthens the positive relationship between informatization and audit quality, making internal control a critical mediating factor.

In this context, informatization is the independent variable, influencing audit quality (the dependent variable), while internal control is a mediating variable. This research focuses on the informatization and digitalization of internal processes in audit firms. These technologies are currently among the most commonly used in transforming audit firms. Additionally, this study explains how external auditing can enrich governance and the development of the CICPA through the development and integration of new digital tools, such as big data analytics and artificial intelligence. In this ever-evolving environment, auditors must complement their professional knowledge and audit practices by developing new ways of thinking, information analysis skills, or acquiring new skills.

## 2.12 Conceptual Framework

This study makes significant theoretical contributions by integrating principal-agent theory, risk management theory, system management theory, and economies of scale. These theories provide a robust foundation for understanding the factors influencing audit quality within auditing firms. As shown in **Figure 2.6**, the conceptual model examines how informatization, internal control, and auditor quality impact audit quality, with the moderation effects of organizational size and the principal-agent relationship.



**Figure 2.6** Conceptual Framework  
(Source: Researcher, 2023)

### 1) Principal-Agent Theory

Principal-agent theory is essential for understanding the dynamics between principals (e.g., shareholders or regulators) and agents (e.g., auditors) in auditing firms. The theory addresses issues such as information asymmetry and conflicts of interest, which are central to ensuring that financial reporting is accurate and reliable (Jensen & Meckling, 1976). In this study, the principal-agent relationship is a moderating variable influencing how internal

control affects audit quality. Internal control includes governance, risk assessment, control activities, and informatization and communication. Effective internal control, dependent on how well the principal-agent relationship is managed, can enhance the reliability and objectivity of audit outcomes (Watts & Zimmerman, 1983).

## 2) System Management Theory

System management theory views an organization as a complex system of interrelated components that must function efficiently to achieve overall objectives (Bertalanffy, 1950). This study applies this theory to examine how various elements within auditing firms—such as informatization infrastructure, personnel training and management, and internal control—interact to improve audit quality. Additionally, the quality of auditors, including their workability, professional ethics, teamwork ability, and innovation ability, plays a crucial role in the firm's overall system effectiveness, leading to better audit outcomes (DeAngelo, 1981; Cao et al., 2015).

## 3) Economies of Size

Economies of scale suggest that larger organizations can achieve cost advantages and greater operational efficiencies due to size (Stigler, 1958). In this study, organizational size is a moderating variable influencing the relationship between informatization, internal control, and audit quality. Larger firms, with more significant resources, can invest in advanced informatization and develop comprehensive internal control systems, enhancing audit quality. In contrast, smaller firms may face challenges due to limited resources, impacting their ability to maintain high standards in these areas (Francis, 2004).

## 2.13 Conclusion

This chapter presents the concept and the theories of the influencing factors and interrelationships, including the measurement dimensions and constructs, namely, internal control, informatization, quality of auditors, audit quality, and organizational size. The of internal control, canonship structure of internal control informatization, quality of auditors, audit quality, organizational size, and principal-agent relationships form the conceptual model for the study. Specifically, the organizational size of an auditing firm has an impact on the audit quality of the firm. However, this effect is not direct; it affects the relationship

between internal control, informatization, quality of auditors, and audit quality, which is called a moderating effect in the study. According to the scale economy theory and risk management theory, organizational size impacts the audit quality of auditing firms. At the same time, the principal-agent theory forms the basis for auditing firms to conduct auditing business, and the development of auditing business requires the support of the principal-agent theory.

The research proposes a conceptual model and corresponding hypotheses based on principal-agent theory, risk management theory, system management theory, and economies of scale, identifying internal control, informatization, and the quality of auditors as critical factors affecting audit quality. Internal control is crucial for managing risks and enhancing audit quality, while informatization improves the efficiency and accuracy of audit processes. The quality of auditors is also essential for ensuring high audit standards. The complexity of the relationship between organizational size and audit quality is highlighted, suggesting that as the scale of auditing firms increases, so does the difficulty of management, which in turn moderates the impact of internal control, informatization, and auditor quality on audit quality. Therefore, it is proposed that internal control, informatization, and auditor quality directly impact audit quality, with organizational size playing a moderating role in these relationships.

In short, the literature review provides a comprehensive review of the constructs and proposes a theoretical framework and basis for improving audit quality. The proposed hypotheses guide the researchers in questionnaire design and SEM validation and, upon validation, provide insights to offer to the practitioners in systematically using the knowledge structure from this study to improve audit quality.

## **Chapter 3**

### **Research Methodology**

In this chapter, details are separated into nine parts as follows:

3.1 Introduction

3.2 Operationalization of Variables

3.3 Hypotheses

3.4 An Analytical Model

3.5 Population and Sampling Methods

3.6 Questionnaire Pre-Test

3.7 The Quality of the Measurement Tool Was Analyzed by Item Analysis

3.8 Research Ethics

3.9 Statistical Method of Analysis

#### **3.1 Introduction**

This study investigates the mediating role of internal control and the moderating mechanisms of auditing firm size and principal-agent relationship in leveraging the functions of auditor quality and informatization on audit quality. The study subjects are the auditing firms in Beijing. The theories of economies of scale, principal-agent relationship, and systems management form the theoretical bases for conceptualizing the model. As the study is explanatory and aims to test theories, it employs a quantitative survey approach (Yilmaz, 2013), with the questionnaire design informed by a comprehensive literature review.

In this study, internal control is a significant mediator, and its core contribution lies in its multi-dimensionality. As noted by Ji et al. (2018), “the most significant difference between China SOX (Sarbanes-Oxley Act) and its counterpart in the US is the scope of internal control in the regulatory framework”. That is, “While the US SOX focuses on internal control over financial reporting, the scope of China SOX is much



wider.” (Ji et al., 2018). Specifically, this study treats internal control as the first-order latent variable, further explained by five second-order latent variables: internal governance, risk assessment, control activities, informatization and communication, and internal supervision. Furthermore, despite robust regulatory institutions, the rapid evolution of advanced technology applications in auditing and internal control processes continues to bring challenges to auditing enterprises (Liu et al., 2024; Wang et al., 2024). Informatization was evaluated through four dimensions: infrastructure, data management, information security, and personnel training and management. Four items were used to measure the principal-agent relationship. Auditor quality was examined across four dimensions: workability, professional ethics, teamwork ability, and innovation ability. The content of the research questionnaire was finalized by analyzing these classic dimensions and integrating relevant theoretical frameworks.

Questionnaire Star offers an avenue for online data collection. The questionnaire was designed using a 7-level Likert size, offering a broader range of participant responses.

### **3.2 Operationalization of Variables**

This section presents the operationalization of the variables. Apart from organization size, principal-agent relationships, and audit quality, which are unitary dimensions, the other variables are multi-dimensional to suit the internal control regulatory framework of China (Ji et al., 2018) and continuing demand for the use of modernized information technology application in auditing system (Liu et al., 2024; Wang et al., 2024).

#### **3.2.1 Organizational Size**

This study uses organizational size as a moderating variable, explicitly examining its role in the impact of auditing firm informatization, internal control, and auditor capabilities on audit quality. An examination of the effect of audit firm size (Geiger et al., 2006; Shan et al., 2019) leads this study to categorize organization size as shown in **Table 3.1**, in terms of micro, small, medium, large, and super large to align with the auditing firm context in China.

The study references the research of numerous scholars, many of whom suggest that organizational size influences audit quality (DeAngelo, 1981; Francis & Yu, 2009). Based

on these insights, this study categorizes audit firms into five groups according to their annual income, following a similar approach used in previous studies (see **Table 3.1**). The questionnaire treats Organizational size as an independent variable, with relevant questions designed accordingly.

**Table 3.1** Organization Size Classification

Group	First-order classification	Second-order classification
<10million	Micro	Small Firms
11-100million	Small	
101-1000million	Medium	Medium-sized Firms
1001-30000million	Large	
>30000million	Super Large	Large Firms

### 3.2.2 Internal Control

Internal control refers to a set of policies, procedures, and practices established to ensure the integrity and reliability of audit reporting, compliance with laws and regulations, and the effectiveness and efficiency of the firm's operations (Ji et al., 2018; Chen & Chen, 2024). In this study, internal control is treated as a mediator. Internal controls are the measures organizations implement to mitigate the potential adverse impacts of unexpected events on their financial reporting, assets, and operations, thereby ensuring the achievement of business objectives. In auditing firms, vital elements of internal control include management responsibilities, risk assessment, control activities, informatization and communication, monitoring, organizational structure, and personnel management. Drawing from research on corporate internal controls and considering the current development status of the CPAI in Beijing, a measurement framework was developed, identifying five critical dimensions: internal governance, risk assessment, control activities, informatization and communication, and internal supervision (COSO, 2013). Each dimension was structured based on a specific logic: internal governance issues were designed around system management, personnel, and compensation evaluation; risk assessment was approached from the perspectives of goal setting, risk identification, process adjustment, and outcomes;

control activities were divided into pre-event, during-event, and post-event actions; informatization and communication were structured around methods, timeliness, and feedback; and internal supervision was organized into processes before, during, and after the fact—a total of 17 questions (see **Table 3.2**).

**Table 3.2** Internal Control Measurement Item

Dimension	Measuring Items	No.
Internal Governance	The auditing firm developed a complete internal control system that is suitable for itself.	IC1
	The staffing of the auditing firm is consistent with the internal control system, and the employee turnover rate is reasonably controlled.	IC2
	The firm establishes a comprehensive performance appraisal system for internal governance.	IC3
Risk Assessment	The adaptability of the auditing firm's risk assessment system to the set risk assessment objectives.	IC4
	The risk assessment system of auditing firms is effective in identifying risks.	IC5
	The auditing firm timely adjusts quality objectives, quality risks, and response measures according to changes in circumstances.	IC6
	The degree of consistency between the risk assessment results prepared by the auditing firm and the actual risks.	IC7
Control Activities	The auditing firm formulates unified technical standards (such as practice guidelines, examples, manuscript templates, etc.) and quality objectives.	IC8
	The auditing firm formulates a reasonable project quality review system, which is effectively implemented.	IC9
	The auditing firm establishes an accountability system for quality management accidents and effectively implements it.	IC10

Dimension	Measuring Items	No.
Informatization And Communication	The auditing firm communicates with people at different levels according to business needs, and the communication methods and channels are effective.	IC11
	Internal and external informatization about the auditing firm's business is disclosed promptly and is true and reliable.	IC12
	The auditing firm adjusts the informatization and communication mechanism based on feedback issues.	IC13
Internal Supervision	The firm effectively carries out project budget management and personnel delegation management.	IC14
	Before the issuance of the audit report, assign a dedicated person to implement project quality supervision (three-level review system) strictly.	IC15
	After the audit report is issued, conduct regular inspections of completed audit projects (inspections of manuscripts and reports, and other informatization inspections).	IC16
	The auditing firm improves the deficiencies identified during supervision and inspection.	IC17

### 3.2.3 Informatization

The informatization of auditing firms refers to the use of informatization technology to change the business model and management methods of auditing firms, improve service quality and efficiency, and thereby enhance their overall competitiveness. Informatization is an independent variable in this study. According to the enterprise informatization measurement size, combined with the current development status of Chinese auditing firms, the measurement size was finally determined as informatization infrastructure, data management, informatization security, personnel training, and management four dimensions, a total of 15 questions (see **Table 3.3**).

**Table 3.3** Informatization Measurement Item

<b>Dimension</b>	<b>Measuring Item</b>	<b>No.</b>
IT Infrastructure	The hardware facilities required for informatization investment in auditing firms meet the requirements for informatization.	IN1
	The auditing firm is equipped with a professional technical department or a high-level computing team.	IN2
	Auditing firm continue to invest in the improvement of informatization systems and the development of innovative audit tools.	IN3
	The auditing firm built a system based on tools such as Hadoop and AI technology to conduct audit work accordingly.	IN4
Data Management	The auditing firm's data management realizes informatization.	IN5
	The daily work of auditing firms is highly informative.	IN6
	Informatization improves the data management efficiency of auditing firm.	IN7
Informatization Security	The informatization of auditing firm ensures the security of informatization management.	IN8
	The auditing firm's informatization system has high security.	IN9
	Informatization of auditing firm in a secure network environment.	IN10
	Employees have a strong awareness of informatization security.	IN11
Personnel training and management	The auditing firm establishes a systematic personnel informatization Personnel Training and Management system.	IN12
	Auditing firm conduct informatization training for employees on a regular or irregular basis.	IN13
	The level of informatization and management of auditing firm positions is very high.	IN14
	Auditors have high informatization quality.	IN15

### 3.2.4 Quality of Auditors

The quality of auditors is another independent variable. Although research has shown that audit quality varies across individual auditors due to, for instance, their experiences and professional training (Li et al., 2024), the treatment of its multidimensionality is rare. As such, this study fills the gaps of the existing literature, using workability, professional ethics, teamwork ability, and innovation ability, as shown in **Table 3.4**.

The quality of auditors in auditing firms has developed a comprehensive and diversified concept, requiring professional knowledge, professional skills, independence, professional ethics, and teamwork. Only auditors with these qualities can ensure the quality and efficiency of audit work and enhance the competitiveness and reputation of auditing firms. According to the measurement scale of the auditors' quality in auditing firms, the auditors' quality is divided into four dimensions: workability, professional ethics, teamwork ability, and innovation ability. Each dimension contains four questions, for a total of 16 questions (see **Table 3.4**).

**Table 3.4** Quality of Auditors Measurement Item

Dimension	Measuring Items	No.
Work Ability	Among employees, CPAs (including those who have passed the comprehensive examination, ACCA, CIA, USCPA, AIA, and CGMA) account for a relatively high proportion of auditors.	QA1
	Auditors must have professional competence.	QA2
	Auditors have strong risk awareness.	QA3
	Auditors have the learning ability to improve themselves continuously.	QA4
Professional Ethics	The auditing firm will establish a mechanism to meet the requirements of professional ethics standards.	QA5
	Auditing firm conduct regular and irregular professional ethics training for auditors.	QA6
	Auditing firm should establish a mechanism to punish employees who violate professional ethics.	QA7
	Auditors can abide by professional ethics.	QA8

Dimension	Measuring Items	No.
Teamwork Ability	Auditing firm work is often completed in the form of a team.	QA9
	Auditing firm have high requirements for the teamwork ability of auditors.	QA10
	Auditors have good interpersonal communication skills.	QA11
	Auditors can help each other and complete tasks together.	QA12
Innovation Ability	Auditing firm encourage employees to innovate.	QA13
	Auditing firm often hold seminars on auditing.	QA14
	Auditors continue to innovate working methods while adhering to professional standards.	QA15
	Auditors are willing to improve work efficiency through innovation.	QA16

### 3.2.5 Principal-Agent Relationships

In the context of Chinese auditing firms, the principal-agent relationship is crucial in ensuring the accuracy and compliance of financial reporting. The principal relies on the agent's expertise, professional knowledge, and independence to maintain the objectivity and reliability of the audit. The agent must uphold strict independence to ensure the principal does not unduly influence the agent's work. Chinese institutions closely monitor and regulate this relationship, including the Ministry of Finance, the CICPA, and public oversight through media scrutiny. Principal-agent relationships have four questions (see **Table 3.5**) and are considered the moderator of the study. The moderation explains the level to which the principal-agent relationship shapes the interrelationships between internal control and quality audit, which aligns with the Elaboration Likelihood Model (ELM)'s route of decisions by the internal auditors to use industry norm, which in this study, is the principal-agent transparency and relational guides, to inform as the auditing industry's norm (cf. Boyle, 2024).

**Table 3.5** Principal-agent Relationships Item

<b>Dimension</b>	<b>Measuring Items</b>	<b>No.</b>
Principal-agent relationships	The principal-agent relationship remains independent and unaffected by the principal.	PAR1
	The principal-agent relationship is objective and impartial, and audit assignments are performed by professional standards and regulations.	PAR 2
	The principal-agent relationship is subject to supervision and control by the government and other authorities.	PAR 3
	The principal-agent relationship ensures that auditors perform their duties rigorously.	PAR 4

### 3.2.6 Audit Quality

Audit quality has developed and is measured by the results of the audit report, and audit quality has developed. It is measured by information accuracy, which is mainly reflected in the effectiveness of the work. The more accurately a company's financial report reflects the company's true financial status and operating results, the higher the audit quality (Francis, 2011; DeFond & Zhang, 2014). The main attributes of audit quality include independence, audit quality satisfaction, types of audit opinions, audit fees, industry supervision and management, market environment, etc. According to the research size on audit quality, the size of this study was set to 5 questions (see **Table 3.6**).

**Table 3.6** Audit Quality Measurement Items

<b>Dimension</b>	<b>Measuring Items</b>	<b>No.</b>
Audit Quality	Your firm has adhered to all relevant auditing standards and legal regulations in its past audit work.	AQ1
	The degree to which the audit process of an auditing firm is subjected to industry supervision.	AQ2
	Auditing firm can effectively manage audit risks.	AQ3
	Auditing firm effectively implements three-level review procedures for audit reports and drafts.	AQ4
	The auditing firm promptly handles the deficiencies identified during supervision and inspection and proposes improvement measures.	AQ5



### 3.3 The Hypotheses

Chapter 2 examines the literature on organization size, internal control, informatization, auditor quality, principal-agent relationships, and their influence on audit quality variables. Hypotheses are proposed regarding these interrelationships.

The quality of internal control and the type and size of auditing firms significantly influence audit quality. Government agencies may mandate firms to implement specific policies to enhance the level of internal control, which, in turn, impacts audit quality. Moreover, governmental bodies can require firms to invest in informatization technologies and software, affecting audit quality. Public opinion monitoring by the media also plays a role in influencing audit quality (DeFond & Zhang, 2014).

The development of informatization within auditing firms is crucial to the broader scope of enterprise informatization. Strengthening strategic planning and management systems and promoting the application and innovation of informatization technologies are essential. Automating complex financial calculations and analyses through accounting software can improve the accuracy and consistency of audit work, thereby reducing human error.

Based on principal-agent theory, the moderating effect of organizational size on the impact of internal control on principal-agent relationships is evident in the complexity of internal controls, audit procedures, staffing, and experience levels. Auditors must design appropriate audit procedures and methods tailored to the company's size and the complexity of its internal control systems to ensure audit quality (Francis, 2011).

Auditing firms that promptly implement high-quality informatization are likely to enhance audit quality. Large auditing firms, with their tighter control environments, can mitigate the negative impact of organizational size on audit quality. Effective internal control systems within these firms can also reduce the occurrence of managerial misconduct (Gul et al., 2009).

Factors such as the organizational size of the auditing firm, degree of industry specialization, communication, cooperation among audit teams, team culture, and senior-level working atmosphere all influence audit quality. Auditors can improve audit

quality by establishing effective communication and cooperation mechanisms, fostering a strong team culture, and creating a high-level working environment (Knechel et al., 2013).

Therefore, the conceptual model's relevant hypotheses are summarized as follows (see **Table 3.7**):

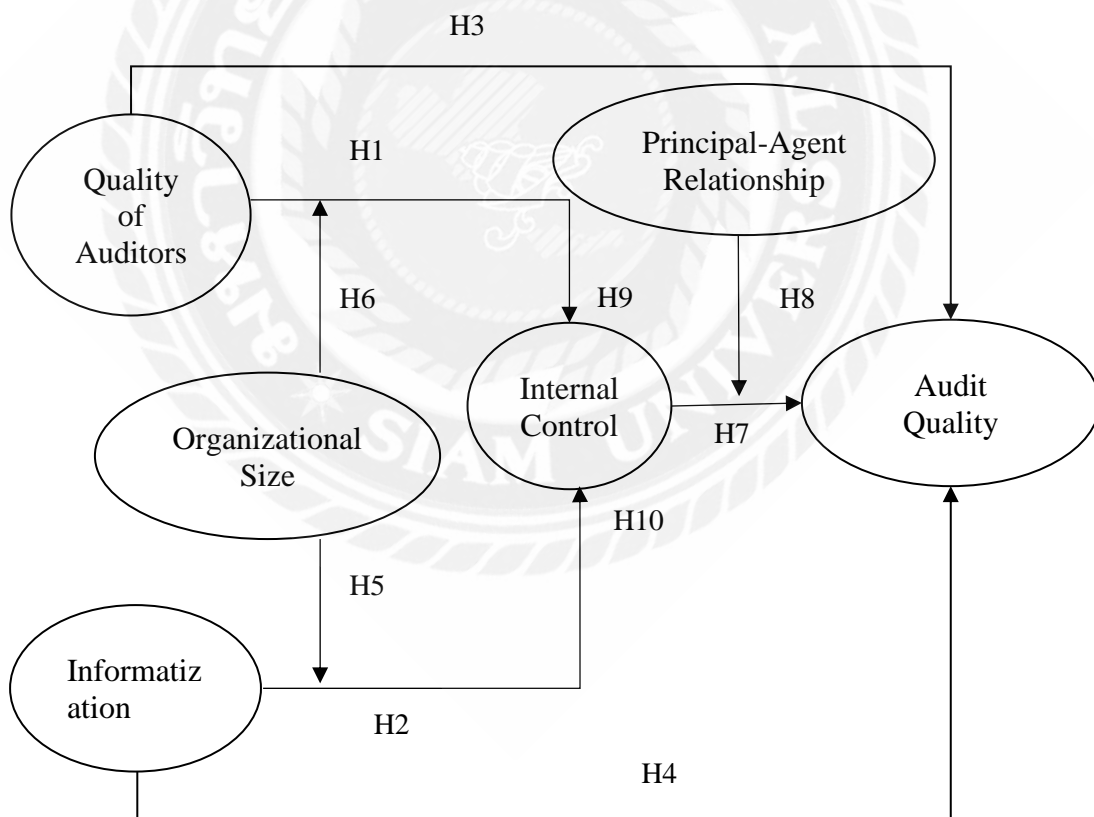
**Table 3.7** The Summary of Hypothesis

No.	Hypotheses
H1	The quality of auditors is positively related to the internal control of auditing firms.
H2	Informatization is positively related to the internal control of auditing firms.
H3	The quality of auditors is positively related to the audit quality of auditing firms.
H4	Informatization is positively related to the audit quality of auditing firms.
H5	Organizational size moderates the relationship between informatization and internal control of auditing firms.
H6	Organizational size moderates the relationship between auditors' quality and auditing firms' internal control.
H7	Internal control is positively related to the audit quality of auditing firms.
H8	The principal-agent relationship moderates the relationship between internal control and audit quality of auditing firms.
H9	Internal control mediates the relationship between the quality of auditors and the audit quality of auditing firms.
H10	Internal control mediates the relationship between informatization and the audit quality of auditing firms.

### 3.4 The Conceptual Model

The ten hypotheses are integrated into the conceptual model shown in **Figure 3.1** and address the three research questions to the study's research objectives. First, with the continuing occurrence of fraudulent accounting and auditing cases, China has imposed a strict internal control regulatory framework (Ji et al., 2018), making internal control a significant mediator. This study takes the individual auditor's effort and quality (Shan et al., 2019) and the increasing significance of informatization (Liu et al., 2024) and considers that internal control plays a critical mediation effect, as shown in

**Figure 3.1**, to impact audit quality. Internal control is rooted in systems management theory. Furthermore, as explained in the hypothetical section and the literature reviews, given the theoretical and practical background explained in Chapter One, the organizational size of auditing firms and principal-agent relationships are also considered vital moderators. Nevertheless, their moderating positions are different, with organizational size having the antecedent impact, as shown in **Figure 3.1**. In contrast, the principal-agent relationship exerts more weight on the consequential part of the model. The principal-agent relationship fills a gap not discussed in Boyle (2024). Boyle (2024) shows that auditors' use of industry norms varies widely from auditor to auditor. However, they do not focus on the principal-agent relationship as the industry norm, which this study contributes.



**Figure 3.1** Conceptual Model  
(Source: Researcher, 2023)

### 3.5 Population and Sampling Methods

To achieve the three objectives of this study, the questionnaire method was considered the most appropriate as it provides the most efficient way to collect data in a standardized form over a large number of units of analysis. In addition, the amount of data collected by Beijing auditing firms is quite large, and in this case, the survey method is the most appropriate choice. The research subjects are full-time employees of auditing firms in Beijing, and all are certified auditors. First, the firm's information relating to the nature of scopes and size of employees of the auditing firms are extracted from the firm's websites. The information is analyzed for appropriateness as a sampling target, including the personnel contacts that the surveys will approach. General auditing firms in Beijing and their information are also carefully reviewed by studying the Chinese Institute of CICPA. After consolidating the database of the registered auditing firms, the study moves to identify the sample target size. The random sampling method is chosen as it offers an equal choice of unbiased selection of certified auditors for survey participation.

To determine the sample-size target(n), the following equation is used:

$$n = \frac{N}{1 + N * E^2}$$

Where n= sample size target, N= total number of study subjects, and E=0.05 is the error term at the 95% confidence level, which indicates that the difference between the sample mean, and the population mean does not exceed 5%.

The total number of certified auditing firms contains about 90,000 auditors (those auditors range from the lowest rank to the top-most rank), which yields a 400-sample size. Considering that the survey method is random sampling, and each of the contacts was established using the contact made through the personnel contact obtained from the website information analysis, it is reckoned that there is possibly about a 34% unresponsive rate. As a result, the survey targeted 600 sets of participation. The questionnaires were distributed directly through Questionnaire Star to personal contacts with explicit instruction that guides how one can respond to the survey, with autonomous and willing participation that meets ethical protocol. The returned data

were coded, tabulated, and analyzed to test the hypotheses developed for the study using the SPSS and AMOS tools.

### **3.6 Questionnaire Pre-Test**

This study pre-tested the questionnaire. Using the online method, three auditing firms in Beijing were selected: Lixin auditing firm (large firms), Zhongruicheng auditing firm (medium-sized firms), and Beijing Zhongzhengcheng auditing firm (small firms). The study distributed and collected questionnaires, identified possible problems with the questionnaire through pre-testing, further screened and revised the questionnaire, and prepared for the formal survey.

In designing questionnaires, implementing surveys, and analyzing results, it is essential to collaborate with relevant individuals and institutions to achieve the expected goals and outcomes of the questionnaire survey. Preliminary research can help identify the critical aspects of the research question and the information that needs to be collected. This approach can lead to obtaining valid and reliable responses. Collaboration can also assist in designing questionnaire questions and options to ensure that the required information is collected more accurately and efficiently. Additionally, it can support data analysis to draw valid conclusions and recommendations. In summary, pre-survey program collaboration helps researchers better design and implement questionnaires, thereby improving the accuracy and reliability of the research.

### **3.7 The Quality of The Measurement Tool Was Analyzed by Item Analysis**

#### **3.7.1 Validity Testing**

This section ensures that the questionnaire design establishes the validity foundation for measurements. Construct and content validities are used for measurement to ensure the questionnaire's validity at the design level. On the other hand, in the data analysis state, convergent and discriminant validity (Islam et al., 2024; Zaman et al., 2024) are typically employed to ensure that the constructs do not overlap in respondents' perceptual views, which also form the basis for unbiased measurements.

### 1) Construct Validity

This study considered six constructs: organization size, quality of auditors, informatization, internal control, principal-agent relationship, and audit quality. Typically, construct validity is reflected by the extent to which the measurement items operationalize the construct, ensuring that the measurements deliver the expected meaning intended by the construct (Bagozzi et al., 1991). The constructs, namely internal control and principal-agent relationships, are systemic and incorporate the theory in characterizing the construct (Peter, 1981). In contrast, the other constructs (organization size, informatization, auditor quality, and audit quality) are a type of construct that refers to “the notion that a construct must be capable of being directly or indirectly operationalized if it is to have explanatory power” (Peter, 1981).

It is further noted in Bagozzi et al. (1991) that “without assessing construct validity, one cannot estimate the confounding influences of random error and method variance, and the results of theory testing may be ambiguous.” This study employs convergent and discriminant validity testing by referring to the procedures undertaken by Islam et al. (2024) and Zaman et al. (2024). While discriminant validity is ensured by the square of total variance explained for the construct to take value more than the cross-correlation terms, the convergent validity is assured by numerous test outcomes, such as factor loadings of the measurement items exceeding 0.7, reliability of Cronbach’s Alpha exceeding 0.8, and that the construct dimensions are evidential from the exploratory factor analysis.

### 2) Content validity

The content validity of a questionnaire refers to whether the content measured by the questionnaire encompasses all aspects that need to be assessed. In other words, content validity indicates that the measurements for each of the defined dimensions of the constructs are operationalized (Sireei, 1998).

Content validity is critical in questionnaire design, as the results will not accurately reflect the actual situation if the questionnaire's content does not cover the necessary areas. Expert evaluation is commonly used to measure content validity. It involves asking relevant experts—such as scholars, researchers, and practitioners—to assess the questionnaire's content to determine whether it adequately covers the

necessary aspects. This evaluation can be conducted qualitatively, through methods like focus group discussions and personal interviews, or quantitatively, using questionnaires or rating scales. Expert evaluation provides valuable feedback and suggestions, helping to improve and refine the questionnaire. Overall, ensuring content validity is crucial to improving the quality and reliability of questionnaires, which was measured in this study through expert evaluation methods. The following prominent members form the subject experts who were invited to assess the content validity of the constructs: Pattsornkun Submahachok (Siam University); Yuwat Vuthimedhi (Siam University, Professor); Jidapa hollathanrattanapong (Siam University, Ph.D.); Li Liou-Yuan (Rajamangala University of Technology Thanyaburi, Associate Professor); Jun Jiang (NIDA, Associate Professor), Li Meizhenand (Zhongruicheng auditing firm Senior Auditor Title), Yang Shu (Baker Tilly China Certified Public Accountants, Authorized Partner), and Zhang Fuxian (Zhongruicheng auditing firm, Senior Accountant Title).

### **3.7.2 Reliability Testing**

Reliability refers to the reliability of the measurement results of the construct, often presented in Cronbach's Alpha term (Iacobucci & Duhachek, 2003). The higher the repeatability and reliability of the construct, the less it will be affected by time, place, and other environments, and the more stable the test results will be. The internal consistency and reliability of the constructs were tested by examining Cronbach's  $\alpha$  coefficient of each size (see **Table 3.8**). The reliability and validity of the questionnaire are judged based on the pre-test of the questionnaire, being assessed by the invited subject experts using item-objective congruence testing. The Index of Item-Objective Congruence (IOC) is a crucial metric for evaluating the content validity of questionnaires and ensuring each item aligns with the study's objectives reliably. By systematically assessing this congruence, the IOC reduces measurement errors and enhances the clarity and relevance of items, thus boosting the instrument's reliability and validity. Developed by Rovinelli and Hambleton in 1977, an IOC value of 0.5 or higher is typically acceptable, indicating the item's consistency with the research objectives. The procedure for IOC is that the subject expert assesses the questionnaire items to fit the definition of the constructs using a scale of -1, 0, and 1.

Experts scored each question on a scale of -1 to 1, with the following meanings:

Score -1 If the expert believes that the measurement item does not measure the construct.

Score 0. If the expert is doubtful that the measurement item measures the desired attribute of the construct.

Score 1 if the expert is confident that the measurement item measures the construct.

After expert evaluation, questions with scores below 0.5 were eliminated, leading to the final selection of 57 questions. The average score of the selected questions exceeded 0.7. The IOC scale resembles the constructs' inter-item consistency, and a value closer to 1 implies robust reliability. A Cronbach's Alpha criterion above 0.7 meets the requirements of internal consistency and reliability, as shown in **Table 3.8** from the pre-testing with the auditors who share similar profiles of the surveys.

**Table 3.8** Cronbach's Alpha Coefficient Result

Variable		Number of Questions	Cronbach's Alpha
Internal Control	Internal Governance	3	0.860
	Risk Assessment	4	0.890
	Control Activities	3	0.794
	Information and Communication	3	0.812
	Internal Supervision	4	0.859
Informatization	Informatization Infrastructure	4	0.910
	Data Management	3	0.868
	Informatization Security	4	0.861
	Personnel Training and Management	4	0.852
Quality of Auditors	Work Ability	4	0.893
	Professional Ethics	4	0.888
	Teamwork Ability	4	0.884
	Innovation Ability	4	0.882
Principal-Agent Relationships		4	0.891
Audit Quality		5	0.925



### **3.8 Research Ethics**

In this research, ethical considerations were rigorously upheld to ensure responsible conduct. Informed consent was a central focus, with participants fully informed about the study's purpose and objectives through an invitation letter. Participation was voluntary, allowing individuals to opt out by simply not proceeding with the consent step. The survey design respected participant autonomy, enabling disengagement at any point. Once consent was given and the questionnaire completed, responses were anonymized and integrated into a larger data pool, ensuring that personal information could not be traced back to individuals.

The research was conducted entirely online to minimize risks, eliminate physical risks, and reduce potential psychological discomfort through carefully worded questions. Confidentiality was maintained using an anonymous survey distribution platform, with participants invited via secure links. Data was stored on a password-protected laptop, with access restricted to the researcher. The data was scheduled for deletion within two weeks after the study's completion, preventing unauthorized access. Finally, research ethics approval was sought and obtained, ensuring academic and ethical standards adherence.

### **3.9 Statistical Method of Analysis**

The data will be analyzed using the SPSS and AMOS programs to test the hypotheses presented in this study. The statistical methods employed are as follows:

First, a descriptive statistical analysis provides an overview of the sample. This analysis includes frequency, percentage, mean, and standard deviation calculations and offers a detailed statistical description of the sample characteristics.

Second, confirmatory factor analysis (CFA) or exploratory factor analysis (EFA) assesses the reliability and validity of the measurement instruments, evidencing the factor loadings and helping validate the underlying structure of the measurements fitting the construct, which sets the stage for subsequent SEM.

Third, SEM validates the relationships of the variables presented in the conceptual model. This analysis tests the research hypotheses by examining the interactions between

variables. Key fit indices such as the Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) offer evidence of the model's adequacy (Hair et al., 2010). The final structural interpretation provides insights into the overall findings and conclusions of the study.



## **Chapter 4**

### **Research Result**

This chapter analyzes the collected data consisting of five parts in total:

4.1 Sample characteristics

4.2 Normal distribution test

4.3 Reliability, Convergent, and Discriminant Validity

4.4 The Structural Equation models and hypothesis testing

4.5 Research Hypotheses Testing Results

The questionnaire-based survey has collected data targeting auditors and management personnel from auditing firms. The survey was designed to gather insights on organizational size, internal control systems, informatization practices, auditor quality, and principal-agent relationships. In the data analysis phase, SPSS was used for descriptive statistics, reliability testing, and regression analysis to determine the relationships between the variables. AMOS was employed to perform SEM to assess the strength of the relationships between organizational size, internal control, informatization, auditor quality, principal-agent relationships, and audit quality. The analysis aimed to explore how these factors impact audit quality in auditing firms. It also examined the moderating role of the principal-agent relationship and the influence of firm size on internal control and audit quality.

The statistical analysis process in this chapter mainly includes the statistical description of control variables and the analysis of the normal distribution of the data while also conducting reliability and validity analysis on the survey data. Reliability analysis employed Cronbach's Alpha and corrected item-total correlation (CITC), and validity testing utilized CFA, including path coefficients, composite reliability (CR), and average variance extracted (AVE). Based on the analysis results, the reliability and distinctiveness of the survey data were ensured. Correlation analysis and SEM were performed after the data passed reliability and validity tests. Constructing structural equation models required verifying the model's fit using indicators such as the GFI, CFI,

adjusted goodness-of-fit index (AGFI), and RMSEA. The model fit must meet the requirements through data analysis, and the model was revised based on the indicators to ensure it appropriately matched the standards. Finally, path analysis was conducted on each variable to verify the hypotheses and draw conclusions.

#### 4.1 Demographic Characteristics Description

Demographic feature description refers to the detailed explanation and analysis of demographic characteristics in a sample to better understand the data, select appropriate models, and make accurate predictions and analyses. The sample characteristics described in this study mainly include gender, age, education level, work experience, and organizational size. Initially, the study targeted and distributed 600 questionnaires, but only 534 valid responses were collected.

**Table 4.1** Sample Feature Description

Variable	Options	Frequency	Percent
Gender	Male	230	43.1%
	Female	304	56.9%
Accountant	No	238	44.6%
	Yes	296	55.4%
Age	under 25 years old	82	15.4%
	26-30 years old	123	23.0%
	31-35 years old	247	46.3%
	36-40 years old	60	11.2%
	over 41 years old	22	4.1%
Education	College and below	46	8.6%
	Bachelor's degree	231	43.3%
	Master's degree	159	29.8%
	Doctoral degree	98	18.4%
Experience	within 1-year	142	26.6%
	1-3 years	104	19.5%
	4-6 years	142	26.6%
	7-10 years	110	20.6%
	more than 10 years	36	6.7%

Variable	Options	Frequency	Percent
Position	Junior staff	177	33.1%
	Intermediate staff	228	42.7%
	Senior staff	62	11.6%
	Salaried partner	58	10.9%
	Equity partner	9	1.7%
Size	10 million Yuan or less	62	11.6%
	10 million Yuan- 100 million Yuan	151	28.3%
	100 million Yuan -1000 million Yuan	127	23.8%
	1000 million Yuan - 3000 million Yuan	135	25.3%
	3000 million Yuan or more	59	11.0%
<b>Total</b>		<b>534</b>	

The statistical results in **Table 4.1** summarize the key demographic features of the sample, which includes gender, accountant status, age, education level, work experience, position, and company size. These characteristics provide insight into the background of the participants and the organizations they represent.

In terms of gender, the sample consists of 230 males (43.1%) and 304 females (56.9%), indicating a higher proportion of female participants. For accountant status, 296 respondents identified as accountants (55.4%), while 238 were non-accountants (44.6%).

Regarding age, 82 respondents (15.4%) were under 25, 123 (23.0%) were aged 26–30, 247 (46.3%) were aged 31–35, 60 (11.2%) were aged 36–40, and 22 (4.1%) were over 41. The largest age group comprises those between 31 and 35 years, representing 46.3% of the sample.

For education level, 46 respondents (8.6%) had a college degree or below, 231 (43.3%) held a bachelor's degree, 159 (29.8%) had a master's degree, and 98 (18.4%) had a doctoral degree, indicating a relatively high educational background.

In terms of work experience, 142 respondents (26.6%) had less than 1 year of experience, 104 (19.5%) had 1–3 years of experience, 142 (26.6%) had 4–6 years, 110 (20.6%) had 7–10 years, and 36 (6.7%) had more than ten years of experience. The largest proportions are among those with less than one year and those with 4–6 years

of experience, each making up 26.6% of the sample.

For position, 177 respondents (33.1%) were junior staff, 228 (42.7%) were intermediate staff, 62 (11.6%) were senior staff, 58 (10.9%) were salaried partners, and 9 (1.7%) were equity partners. Most respondents were in intermediate staff positions (42.7%).

In terms of organizational size, 62 respondents (11.6%) worked in companies with assets of 10 million Yuan or less, 151 respondents (28.3%) worked in organizations with assets between 10 million and 100 million Yuan, 127 respondents (23.8%) worked in organizations with assets between 100 million and 1 billion Yuan, 135 respondents (25.3%) worked in organizations with assets between 1 billion and 3 billion Yuan, and 59 respondents (11.0%) worked in organizations with assets over 3 billion Yuan.

Overall, the table demonstrates the diversity of the sample in terms of gender, age, education level, work experience, position, and company size. These demographic characteristics serve as a foundation for further analysis and help understand the background of the study's participants.

## **4.2 Normal Distribution Test**

### **4.2.1 Internal Control**

Internal control is determined by five dimensions: internal governance, risk assessment, control activities, information and communication, and internal supervision. Seventeen questions were designed, and the results were analyzed using SPSS, presented in **Table 4.2**. Based on the data analysis, the overall mean scores for each item ranged between 4.4 and 5.8. The questionnaire used in this study employed a 7-point Likert scale, and the data analysis results suggest that the respondents' understanding of the research topic was above average, indicating a moderately high level of awareness. In addition, skewness and kurtosis analyses were conducted for each measurement item. According to Kline (2015), if the absolute value of the skewness coefficient is less than three and the absolute value of the kurtosis coefficient is less than 8, the data are considered to follow a normal distribution. Thus, the data meet the

criteria for normality.

**Table 4.2** Percentage Distribution of Internal Control

Item	Mean Statistic	Std.Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
IC1	4.788	0.087	4.036	-0.490	-1.027
IC2	4.678	0.081	3.510	-0.477	-0.844
IC3	4.538	0.078	3.288	-0.409	-0.867
IC4	4.800	0.093	4.615	-0.502	-1.201
IC5	4.547	0.081	3.483	-0.357	-0.781
IC6	4.468	0.083	3.687	-0.427	-0.795
IC7	4.788	0.079	3.372	-0.553	-0.541
IC8	4.556	0.084	3.744	-0.466	-0.783
IC9	5.803	0.059	1.881	-1.154	1.047
IC10	5.082	0.072	2.785	-0.625	-0.509
IC11	4.983	0.076	3.112	-0.561	-0.479
IC12	5.079	0.073	2.812	-0.549	-0.686
IC13	5.182	0.078	3.282	-0.605	-0.939
IC14	4.566	0.090	4.336	-0.366	-1.086
IC15	5.041	0.076	3.060	-0.542	-0.803
IC16	4.998	0.083	3.702	-0.665	-0.721
IC17	4.871	0.082	3.632	-0.650	-0.730

#### 4.2.2 Informatization

Informatization is categorized into four dimensions: infrastructure, data management, informatization security, and personnel training and management. A total of 15 questions were designed, and the results were analyzed using SPSS, as shown in **Table 4.3**. Based on the data analysis, the mean scores for each item ranged between 4.2 and 5.2. The questionnaire employed a 7-point Likert scale, and the data analysis results indicate that the respondents' understanding of the research topic was above average, signifying a relatively high level of awareness. Additionally, skewness and kurtosis analyses were conducted for each item. According to Kline (2015), if the absolute value of the skewness coefficient is less than three and the absolute value of the kurtosis coefficient is less than 8, the data are considered to follow a normal distribution. Therefore, the data conform to normality criteria.

**Table 4.3** Percentage distribution of Informatization

Item	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness	Kurtosis
IN1	4.313	0.076	3.116	-0.184	-0.775
IN2	4.243	0.076	3.051	-0.171	-0.669
IN3	4.345	0.078	3.209	-0.255	-0.702
IN4	5.200	0.070	2.592	-0.632	-0.182
IN5	4.893	0.081	3.518	-0.645	-0.495
IN6	5.099	0.076	3.058	-0.721	-0.224
IN7	5.213	0.071	2.705	-0.774	0.040
IN8	5.161	0.083	3.640	-0.720	-0.587
IN9	4.794	0.078	3.248	-0.496	-0.502
IN10	5.150	0.068	2.443	-0.439	-0.478
IN11	5.176	0.068	2.457	-0.484	-0.537
IN12	4.728	0.084	3.767	-0.378	-0.985
IN13	4.404	0.082	3.607	-0.308	-0.861
IN14	4.506	0.085	3.871	-0.469	-0.838
IN15	4.479	0.090	4.299	-0.296	-1.233

#### 4.2.3 Quality of Auditors

The quality of auditors is divided into four dimensions: workability, professional ethics, teamwork ability, and innovation ability. A total of 16 questions were designed, with four questions for each dimension, and the results were analyzed using SPSS, as shown in **Table 4.4**. Based on the data analysis, the mean scores for each item ranged between 4.2 and 5.2, indicating that the respondents' understanding of auditor quality was above average, reflecting a moderately high level of awareness. In addition, skewness and kurtosis analyses were conducted for each measurement item. According to Kline (2015), if the absolute value of the skewness coefficient is less than three and the absolute value of the kurtosis coefficient is less than 8, the data are considered to follow a normal distribution. Therefore, the data meet the normality criteria.



**Table 4.4** Percentage Distribution of Quality of Auditors

Item	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
QA1	4.605	0.082	3.568	-0.399	-0.824
QA2	4.496	0.080	3.384	-0.347	-0.867
QA3	4.588	0.085	3.819	-0.398	-0.943
QA4	4.607	0.079	3.305	-0.377	-0.820
QA5	4.551	0.080	3.460	-0.380	-0.843
QA6	4.410	0.081	3.544	-0.212	-0.927
QA7	4.223	0.078	3.269	-0.127	-0.800
QA8	5.281	0.081	3.486	-0.911	-0.186
QA9	4.861	0.085	3.842	-0.477	-0.886
QA10	5.060	0.081	3.501	-0.575	-0.830
QA11	4.863	0.089	4.186	-0.538	-1.010
QA12	4.951	0.076	3.067	-0.426	-0.755
QA13	4.843	0.078	3.225	-0.442	-0.644
QA14	4.897	0.083	3.714	-0.442	-0.976
QA15	4.871	0.078	3.223	-0.463	-0.766
QA16	4.798	0.081	3.539	-0.463	-0.842

#### 4.2.4 Principal-Agent Relationships

Four items measure the principal-agent relationships, and the results were analyzed using SPSS, as shown in **Table 4.5**. Based on the data analysis, the mean scores for each item ranged between 4.1 and 5, indicating that the respondents' understanding of principal-agent relationships was above average, reflecting a moderately high level of awareness. In addition, skewness and kurtosis analyses were conducted for each measurement item. According to Kline (2015), if the absolute value of the skewness coefficient is less than three and the absolute value of the kurtosis coefficient is less than 8, the data are considered to follow a normal distribution. Therefore, the data meet the normality criteria.

**Table 4.5** Percentage Distribution of Principal-agent Relationships

Item	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
PAR1	4.788	0.085	3.814	-0.514	-0.894
PAR2	5.017	0.084	3.761	-0.673	-0.754
PAR3	4.708	0.088	4.173	-0.441	-1.075
PAR4	4.150	0.088	4.109	-0.178	-1.177

#### 4.2.5 Audit Quality

Five items measure audit quality, and the results were analyzed using SPSS, as shown in **Table 4.6**. Based on the data analysis, the mean scores for each item ranged between 3.8 and 4.5. The scale used a 7-point Likert scale, and the data analysis results suggest that the respondents' understanding of audit quality is above average, indicating a moderately high level of awareness. Additionally, skewness and kurtosis analyses were conducted for each measurement item. According to Kline (2015), if the absolute value of the skewness coefficient is less than three and the absolute value of the kurtosis coefficient is less than 8, the data are considered to follow a normal distribution. Therefore, the results show that the absolute skewness and kurtosis values for each dimension meet the required standards for normality.

**Table 4.6** Percentage Distribution of Audit Quality

Item	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
AQ1	3.856	0.088	4.135	0.106	-1.224
AQ2	4.129	0.087	4.079	0.106	-1.091
AQ3	4.275	0.084	3.780	0.106	-0.982
AQ4	4.420	0.083	3.681	0.106	-0.892
AQ5	4.470	0.082	3.634	0.106	-0.841

Based on the analysis of data for internal control, informatization, quality of auditors, principal-agent relationships, and audit quality, all variables meet the normal distribution requirements, indicating that further statistical analyses, such as correlation analysis, regression analysis, and SEM, can be conducted. Normal distribution is a fundamental assumption in many statistical methods, and its conformity ensures the

accuracy and validity of subsequent analyses. Next, a correlation analysis can be performed to explore the significant associations between variables. Additionally, regression analysis can be used further to investigate the impact of independent variables on dependent variables. For more complex relationship models, SEM can conduct an in-depth analysis, evaluating the direct and indirect pathways between variables.

### **4.3 Reliability, Convergent, and Discriminant Validity**

#### **4.3.1 Reliability**

The reliability of the internal control scale, covering five dimensions—Internal Governance, Risk Assessment, Control Activities, Information and Communication, and Internal Supervision—was assessed using Cronbach's Alpha and CITC. As presented in Table 4.7, the analysis shows that Cronbach's Alpha for all dimensions exceeded 0.79, indicating strong internal consistency. The CITC values for each item were higher than 0.63, demonstrating sufficient internal consistency across all items. The Cronbach's Alpha if Item Deleted values for each item were consistently lower than the overall Cronbach's Alpha for the corresponding dimension, indicating that no item negatively impacted the scale's reliability. According to Nunnally and Bernstein (1994), Cronbach's Alpha values above 0.7 are typically considered acceptable for psychological and social science research, while CITC values above 0.5 indicate strong item reliability (Hair et al., 2010). Therefore, the scale used to measure internal control demonstrates high reliability across all five dimensions, ensuring the robustness of the instrument for further analysis.

**Table 4.7** Internal Control Reliability Analysis

<b>Dimension</b>	<b>Item</b>	<b>Corrected Item-Total Correlation</b>	<b>Cronbach's Alpha if Item Deleted</b>	<b>Cronbach's Alpha</b>
Internal Governance	IC1	0.759	0.783	0.860
	IC2	0.767	0.775	
	IC3	0.685	0.849	
Risk Assessment	IC4	0.773	0.855	0.890
	IC5	0.714	0.874	
	IC6	0.752	0.860	
	IC7	0.802	0.843	
Control Activities	IC8	0.655	0.720	0.794
	IC9	0.636	0.742	
	IC10	0.661	0.694	
Information and communication	IC11	0.678	0.726	0.812
	IC12	0.639	0.766	
	IC13	0.672	0.733	
Internal Supervision	IC14	0.700	0.824	0.859
	IC15	0.722	0.815	
	IC16	0.704	0.820	
	IC17	0.698	0.822	

The reliability of the informatization scale, covering four dimensions—IT Infrastructure, Data Management, Informatization Security, and Training for Informatization Management—was assessed using Cronbach's Alpha and CITC. Table 4.8 shows that the analysis of Cronbach's Alpha for all dimensions exceeded 0.85, indicating strong internal consistency. The CITC values for each item were higher than 0.6, demonstrating sufficient internal consistency across all items. The Cronbach's Alpha if Item Deleted values for each item were consistently lower than the overall Cronbach's Alpha for the corresponding dimension, indicating that no item negatively impacted the scale's reliability. According to Nunnally and Bernstein (1994), Cronbach's Alpha values above 0.7 are typically considered acceptable for psychological and social science research, while CITC values above 0.5 indicate strong item reliability (Hair et al., 2010). Therefore, the scale used to measure informatization demonstrates high reliability across all four dimensions, ensuring the robustness of the

instrument for further analysis.

**Table 4.8** Informatization Reliability Analysis

<b>Dimension</b>	<b>Item</b>	<b>Corrected Item- Total Correlation</b>	<b>Cronbach's Alpha if Item Deleted</b>	<b>Cronbach's Alpha</b>
IT Infrastructure	IN1	0.824	0.873	0.910
	IN2	0.836	0.868	
	IN3	0.806	0.879	
	IN4	0.719	0.909	
Data Management	IN5	0.779	0.787	0.868
	IN6	0.732	0.828	
	IN7	0.740	0.824	
Informatization Security	IN8	0.663	0.846	0.861
	IN9	0.674	0.837	
	IN10	0.719	0.820	
	IN11	0.798	0.789	
Training For Informatization Management	IN12	0.619	0.842	0.852
	IN13	0.721	0.801	
	IN14	0.727	0.797	
	IN15	0.707	0.806	

The reliability of the quality of auditors, covering four dimensions—Work Ability, Professional Ethics, Teamwork Ability, and Innovation Ability—was assessed using Cronbach's Alpha and CITC. Table 4.9 shows that the analysis of Cronbach's Alpha for all dimensions exceeded 0.88, indicating strong internal consistency. The CITC values for each item were higher than 0.7, demonstrating sufficient internal consistency across all items. The Cronbach's Alpha if Item Deleted values for each item were consistently lower than the overall Cronbach's Alpha for the respective dimension, indicating that no item negatively impacted the scale's reliability. According to Nunnally and Bernstein (1994), Cronbach's Alpha values above 0.7 are acceptable for psychological and social science research, while CITC values above 0.5 indicate strong item reliability (Hair et al., 2010). Therefore, the scale used to measure the quality of auditors demonstrates high reliability across all four dimensions, ensuring the robustness of the instrument for further analysis.

**Table 4.9** Quality of Auditors Reliability Analysis

Dimension	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Work Ability	QA1	0.810	0.845	0.893
	QA2	0.747	0.869	
	QA3	0.739	0.873	
	QA4	0.763	0.863	
Professional Ethics	QA5	0.760	0.854	0.888
	QA6	0.746	0.860	
	QA7	0.732	0.865	
	QA8	0.781	0.846	
Teamwork Ability	QA9	0.719	0.863	0.884
	QA10	0.720	0.862	
	QA11	0.732	0.860	
	QA12	0.836	0.822	
Innovation Ability	QA13	0.749	0.846	0.882
	QA14	0.739	0.850	
	QA15	0.739	0.850	
	QA16	0.746	0.847	

The reliability of the principal-agent relationships size, covering a single dimension—Principal-Agent Relationships—was assessed using Cronbach's Alpha and CITC. The analysis, as presented in **Table 4.10**, shows that the Cronbach's Alpha for this dimension is 0.891, indicating strong internal consistency. The CITC values for each item were higher than 0.73, demonstrating sufficient internal consistency across all items. The Cronbach's Alpha if Item Deleted values for each item were consistently lower than the overall Cronbach's Alpha for the dimension, indicating that no item negatively impacted the scale's reliability. According to Nunnally and Bernstein (1994), Cronbach's Alpha values above 0.7 are acceptable for psychological and social science research, while CITC values above 0.5 indicate strong item reliability (Hair et al., 2010). Therefore, the scale used to measure principal-agent relationships demonstrates high reliability, ensuring the robustness of the instrument for further analysis.

**Table 4.10** Principal-Agent Relationships Reliability Analysis

Dimension	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Principal-Agent Relationships	PAR1	0.805	0.843	0.891
	PAR2	0.762	0.859	
	PAR3	0.741	0.867	
	PAR4	0.733	0.870	

The reliability of the audit quality size, covering a single dimension—Audit Quality—was assessed using Cronbach's Alpha and CITC. The analysis, as presented in **Table 4.11**, shows that Cronbach's Alpha for this dimension is 0.925, indicating a very high level of internal consistency. The CITC values for each item were higher than 0.75, demonstrating sufficient internal consistency across all items. The Cronbach's Alpha if Item Deleted values for each item were consistently lower than the overall Cronbach's Alpha, indicating that no item negatively impacted the reliability of the scale. According to Nunnally and Bernstein (1994), Cronbach's Alpha values above 0.7 are acceptable for psychological and social science research, while CITC values above 0.5 indicate strong item reliability (Hair et al., 2010). Therefore, the scale used to measure audit quality demonstrates high reliability, ensuring the robustness of the instrument for further analysis.

**Table 4.11** Audit Quality Reliability Analysis

Dimension	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Audit Quality	AQ1	0.835	0.902	0.925
	AQ2	0.817	0.905	
	AQ3	0.852	0.898	
	AQ4	0.760	0.916	
	AQ5	0.756	0.917	

The reliability analysis of the five variables—internal control, informatization, quality of auditors, principal-agent relationships, and audit quality—demonstrates strong internal consistency across all dimensions. Cronbach's Alpha values for these variables ranged from 0.79 to 0.93, exceeding the generally accepted threshold of 0.7,

which signifies strong reliability. CITC values for all items were above 0.6, indicating that each item contributed meaningfully to its respective scale. Furthermore, the Cronbach's Alpha if Item Deleted values were consistently lower than the overall Cronbach's Alpha for each variable, confirming that no item detracted from the scale's reliability. These indicators demonstrate that the scales used for assessing each variable are reliable and suitable for further analysis.

#### **4.3.2 Confirmatory Factor Analysis**

The primary purpose of CFA is to assess whether the hypothesized measurement model fits well with the observed data. CFA validates the structural relationships between latent variables (constructs) and their observed indicators. AVE measures the level of variance captured by a construct about the variance due to measurement error, with values above 0.50 indicating that the construct explains most of the variance in its observed indicators, thus demonstrating good convergent validity. CR assesses the internal consistency of the construct's indicators, with values above 0.70 reflecting strong reliability and suggesting that the indicators consistently measure the latent variable. By evaluating the factor loadings of observed variables on their respective latent constructs, as well as the model's convergent and discriminant validity, CFA ensures that the indicators accurately measure the intended constructs while maintaining distinction from other constructs. Fundamental model fit indices, such as CFI, GFI, and RMSEA, are commonly used to assess how well the proposed model fits the data, guiding researchers to confirm or further refine the measurement model. Therefore, this study employs CFA to comprehensively analyze several variables, including internal control, informatization, quality of auditors, principal-agent relationships, and audit quality.

Internal control is divided into five dimensions: internal governance, risk assessment, control activities, information and communication, and internal supervision. The results of AVE and CR presented in **Table 4.12** show that the AVE values for each dimension range from 0.58 to 0.68, meeting the minimum threshold of 0.50 suggested by Hair et al. (2010), indicating that the dimensions exhibit good convergent validity, meaning these dimensions can explain enough variance of their corresponding latent variables. The CR values range from 0.80 to 0.89, all exceeding



the minimum standard of 0.70 proposed by Fornell and Larcker (1981), demonstrating consistent internal consistency across dimensions. This suggests that the measurement items within each dimension exhibit high reliability and consistency, effectively measuring their underlying constructs. Based on these indicators, the internal control model is theoretically feasible and well-supported by empirical data.

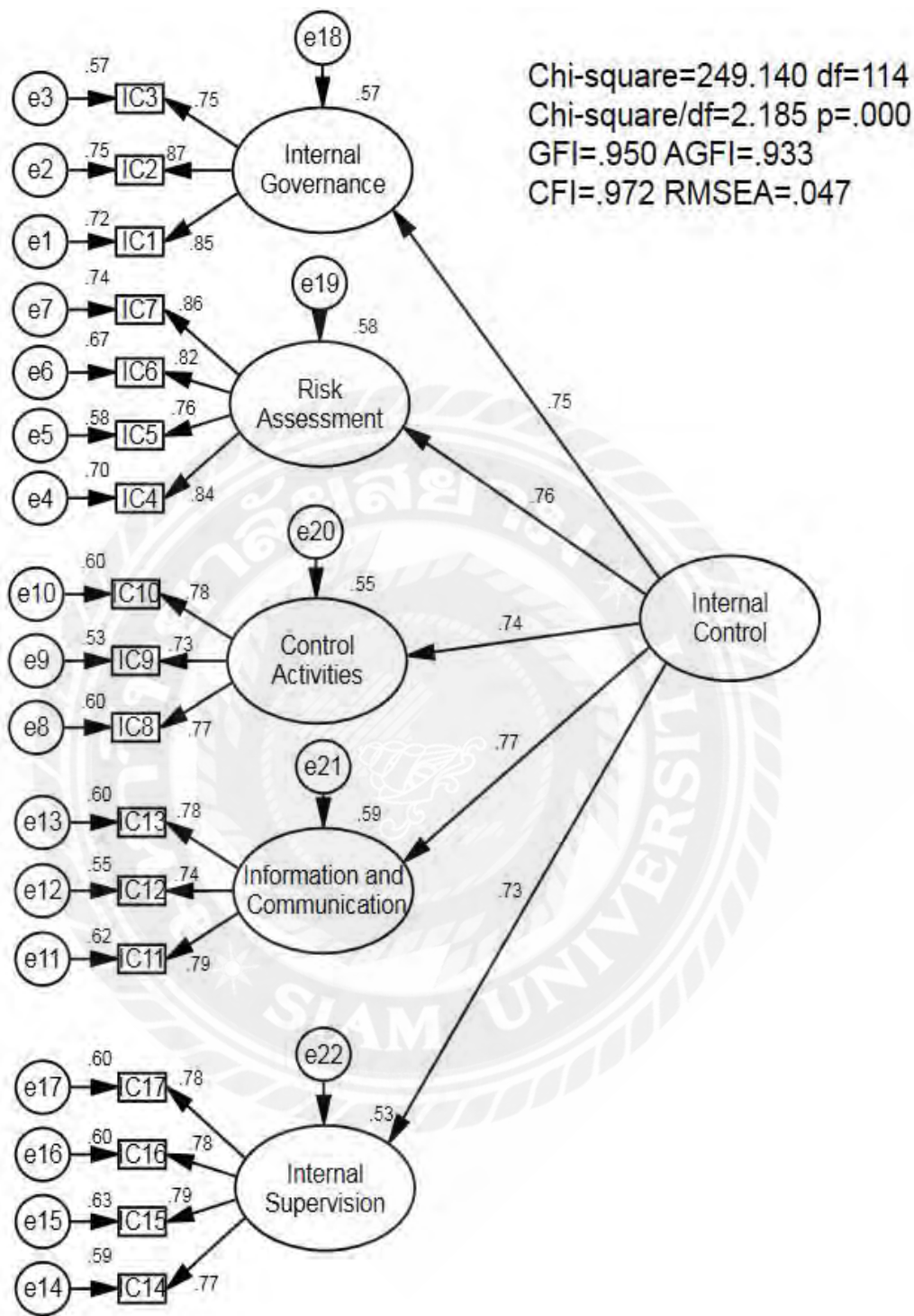
**Table 4.12** AVE and CR of Internal Control

Path relationship			Estimate	AVE	CR
IC1	<---	Internal Governance	0.85	0.68	0.86
IC2	<---	Internal Governance	0.87		
IC3	<---	Internal Governance	0.75		
IC4	<---	Risk Assessment	0.84	0.67	0.89
IC5	<---	Risk Assessment	0.76		
IC6	<---	Risk Assessment	0.82		
IC7	<---	Risk Assessment	0.86		
IC8	<---	Control Activities	0.77	0.58	0.80
IC9	<---	Control Activities	0.73		
IC10	<---	Control Activities	0.78		
IC11	<---	Information and Communication	0.79	0.59	0.81
IC12	<---	Information and Communication	0.74		
IC13	<---	Information and Communication	0.78		
IC14	<---	Internal Supervision	0.77	0.61	0.86
IC15	<---	Internal Supervision	0.79		
IC16	<---	Internal Supervision	0.78		
IC17	<---	Internal Supervision	0.78		

The factor loadings and model fit of the internal control model were analyzed. Figure 4.1 represents the internal control structure, illustrating the relationships between observed variables and their corresponding latent constructs. The figure shows the factor loadings for the five dimensions: internal governance, risk assessment, control activities, information and communication, and internal supervision, with all observed variables having loadings above 0.55 and most exceeding 0.70 or 0.75, indicating that the observed indicators significantly explain their respective latent variables. The model fit indices—GFI = 0.950, CFI = 0.972, and RMSEA = 0.047—

are all within acceptable ranges (Hu & Bentler, 1999), demonstrating that the model fits well, accurately reflecting the data structure. The Chi-square/df ratio of 2.185 is also within acceptable limits, further supporting the adequacy of the model's fit. The firm model fit suggests that the structure is robust and suitable for further analysis and prediction. The high correlations between latent variables, such as those between internal governance, risk assessment, and internal control, further validate the model's effectiveness and robustness, confirming its reliability in explaining the relationships between dimensions.





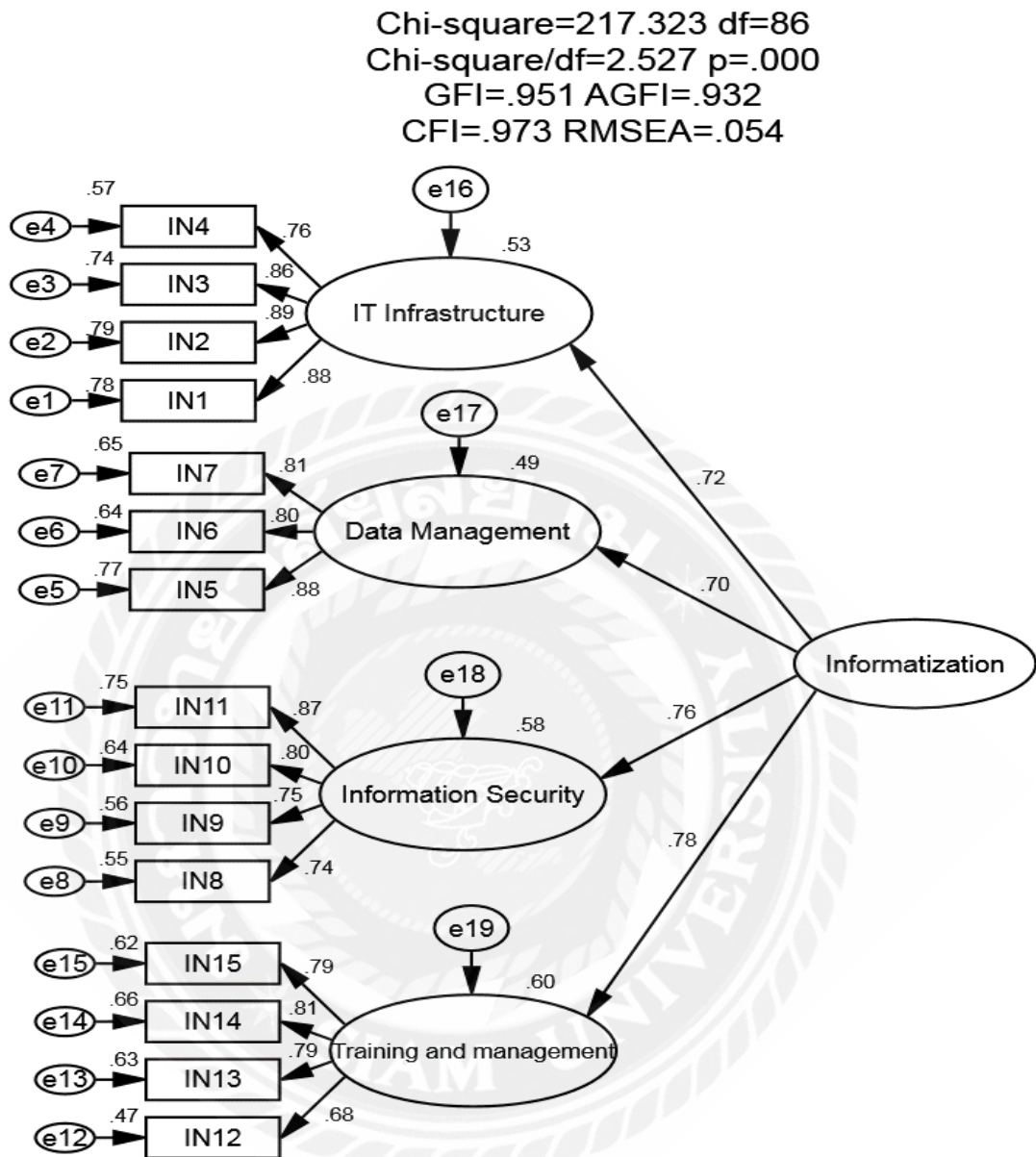
**Figure 4.1** Confirmatory Factor Analysis of Internal Control  
 (Source: Researcher, 2024)

Informatization is divided into four dimensions, including IT infrastructure, data management, informatization security, and personnel training and management. The results of AVE and CR presented in **Table 4.13** show that the AVE values for each dimension range from 0.60 to 0.72, meeting the minimum threshold of 0.50 suggested by Hair et al. (2010), indicating that the dimensions exhibit good convergent validity. This means these dimensions can explain a sufficient amount of variance in their corresponding latent variables. The CR values range from 0.85 to 0.91, all exceeding the minimum standard of 0.70 proposed by Fornell and Larcker (1981), demonstrating strong internal consistency across dimensions. This suggests that the measurement items within each dimension exhibit high reliability and consistency, effectively measuring their underlying constructs. Based on these indicators, the informatization model is not only theoretically sound but also well-supported by empirical data.

**Table 4.13** AVE and CR of Informatization

Path Relationship			Estimate	AVE	CR
IN1	<---	IT Infrastructure	0.88	0.72	0.91
IN2	<---	IT Infrastructure	0.89		
IN3	<---	IT Infrastructure	0.86		
IN4	<---	IT Infrastructure	0.76		
IN5	<---	Data Management	0.88	0.69	0.87
IN6	<---	Data Management	0.80		
IN7	<---	Data Management	0.81		
IN8	<---	Informatization Security	0.74	0.63	0.87
IN9	<---	Informatization Security	0.75		
IN10	<---	Informatization Security	0.80		
IN11	<---	Informatization Security	0.87		
IN12	<---	Personnel Training and Management	0.68	0.60	0.85
IN13	<---	Personnel Training and Management	0.79		
IN14	<---	Personnel Training and Management	0.81		
IN15	<---	Personnel Training and Management	0.79		

The factor loadings and model fit of the informatization model were analyzed, and **Figure 4.2** provides a clear visual representation of the informatization structure, illustrating the relationships between observed variables and their corresponding latent constructs. The figure shows the factor loadings for the four dimensions: IT infrastructure, data management, information security, and training and management, with all observed variables having loadings above 0.60 and most exceeding 0.70 or 0.75, indicating that the observed indicators significantly explain their respective latent variables. The model fit indices—GFI = 0.951, CFI = 0.973, and RMSEA = 0.054—are all within acceptable ranges (Hu & Bentler, 1999), demonstrating that the model fits well, accurately reflecting the data structure. The Chi-square/df ratio of 2.527 is also within acceptable limits, further supporting the adequacy of the model's fit. The firm model fit suggests that the structure is robust and suitable for further analysis and prediction. The high correlations between latent variables, such as IT infrastructure, data management, and informatization, further validate the model's effectiveness and robustness, confirming its reliability in explaining the relationships between dimensions.



**Figure 4.2** Confirmatory Factor Analysis of Informatization  
 (Source: Researcher, 2024)

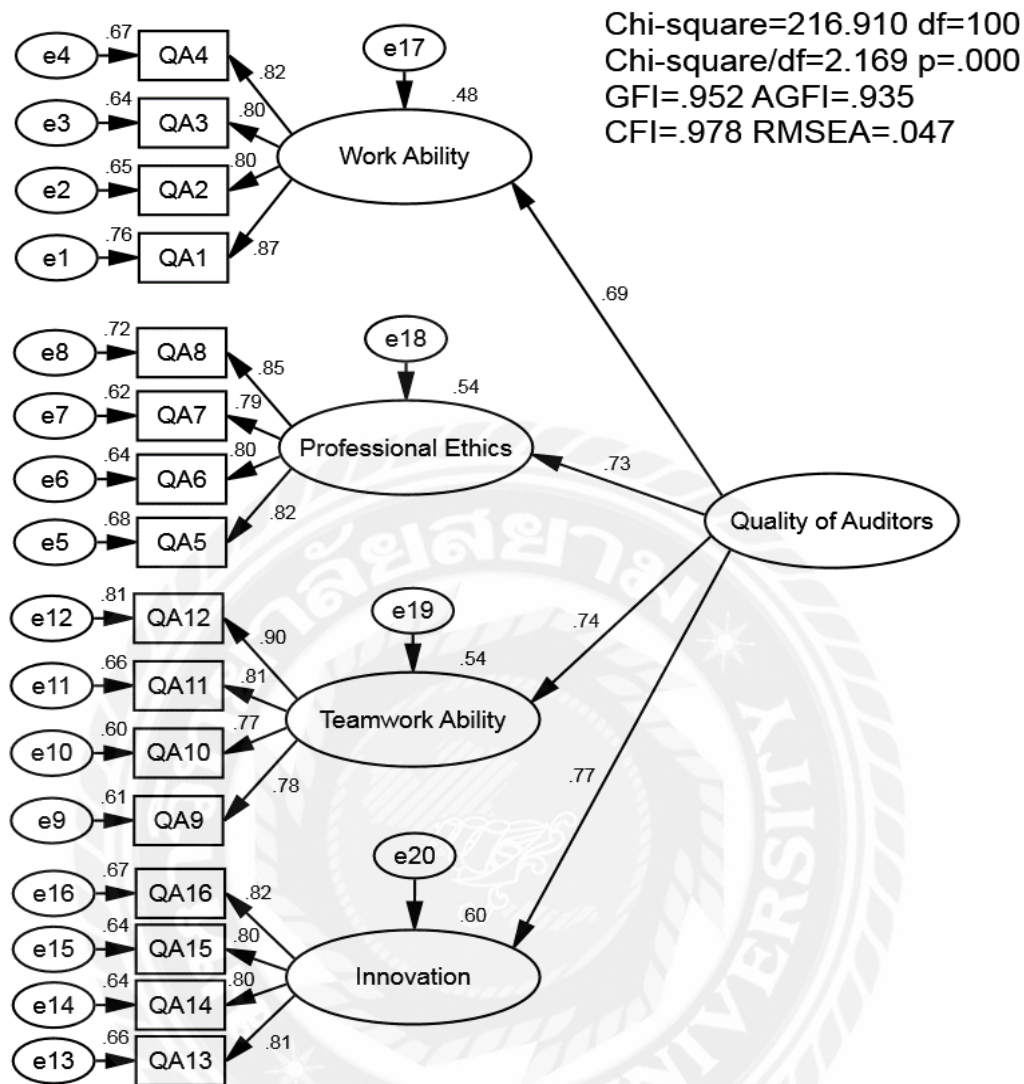
The quality of an auditor is divided into four dimensions: workability, professional ethics, teamwork ability, and innovation. The results of AVE and CR presented in **Table 4.14** show that the AVE values for each dimension range from 0.65 to 0.68, exceeding the minimum threshold of 0.50 suggested by Hair et al. (2010), indicating that the dimensions exhibit good convergent validity. This means these dimensions can explain sufficient variance in their corresponding latent variables. The CR values range from 0.88 to 0.89, all surpassing the minimum standard of 0.70 proposed by Fornell and Larcker (1981), demonstrating consistent internal consistency across dimensions. This suggests that the measurement items within each dimension exhibit high reliability and consistency, effectively measuring their underlying constructs. Based on these indicators, the quality of the auditor model is both theoretically sound and well-supported by empirical data.

**Table 4.14** AVE and CR of Quality of Auditors

Path Relationship			Estimate	AVE	CR
QA1	<---	Work Ability	0.87	0.68	0.89
QA2	<---	Work Ability	0.80		
QA3	<---	Work Ability	0.80		
QA4	<---	Work Ability	0.82		
QA5	<---	Professional Ethics	0.82	0.66	0.89
QA6	<---	Professional Ethics	0.80		
QA7	<---	Professional Ethics	0.79		
QA8	<---	Professional Ethics	0.85		
QA9	<---	Teamwork Ability	0.78	0.67	0.89
QA10	<---	Teamwork Ability	0.77		
QA11	<---	Teamwork Ability	0.81		
QA12	<---	Teamwork Ability	0.90		
QA13	<---	Innovation Ability	0.81	0.65	0.88
QA14	<---	Innovation Ability	0.80		
QA15	<---	Innovation Ability	0.80		
QA16	<---	Innovation Ability	0.81		

The factor loadings and model fit of the quality of the auditors' model were analyzed. Figure 4.3 provides a clear visual representation of the quality of the auditors' structure, illustrating the relationships between observed variables and their corresponding latent constructs. The figure shows the factor loadings for the four dimensions: workability, professional ethics, teamwork ability, and innovation, with all observed variables having loadings above 0.60 and most exceeding 0.75, indicating that the observed indicators significantly explain their respective latent variables. The model fit indices—GFI = 0.952, CFI = 0.978, and RMSEA = 0.047—are all within acceptable ranges (Hu & Bentler, 1999), demonstrating that the model fits well, accurately reflecting the data structure. The Chi-square/df ratio of 2.169 is also within acceptable limits, further supporting the adequacy of the model's fit. The firm model fit suggests that the structure is robust and suitable for further analysis and prediction. The high correlations between latent variables, such as workability, professional ethics, and overall quality of auditors, further validate the model's robustness and effectiveness, confirming its reliability in explaining the relationships between dimensions.





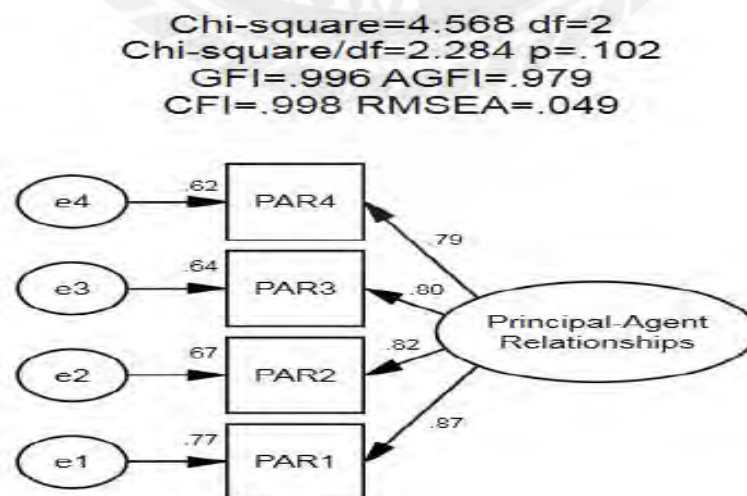
**Figure 4.3** Confirmatory Factor Analysis of Quality of Auditors  
 (Source: Researcher, 2024)

Principal-agent relationships are measured using four observed variables, as shown in **Table 4.15**. The AVE value for principal-agent relationships is 0.68, exceeding the minimum threshold of 0.50 suggested by Hair et al. (2010), indicating good convergent validity. The CR value of 0.89 also surpasses the minimum standard of 0.70 proposed by Fornell and Larcker (1981), demonstrating consistent internal consistency across the measurement items. These high values indicate that the items reliably and consistently capture the underlying construct of principal-agent relationships. Based on these indicators, the principal-agent relationships model is theoretically sound and well-supported by empirical data.

**Table 4.15** AVE and CR of Principal-agent Relationships

Path Relationship			Estimate	AVE	CR
PAR1	<---	Principal-agent Relationships	0.87	0.68	0.89
PAR2	<---	Principal-agent Relationships	0.82		
PAR3	<---	Principal-agent Relationships	0.80		
PAR4	<---	Principal-agent Relationships	0.79		

The analysis of factor loadings and model fit for the principal-agent relationships model is illustrated in **Figure 4.4**, which provides a clear depiction of the relationships between the observed variables (PAR1, PAR2, PAR3, and PAR4) and the latent construct. All observed variables have factor loadings greater than 0.75, suggesting that these observed variables strongly represent the underlying construct of principal-agent relationships. According to Hair et al. (2010), factor loadings of 0.70 or higher are generally acceptable, indicating strong correlations between observed variables and their corresponding constructs. The model fit indices—GFI = 0.996, CFI = 0.998, and RMSEA = 0.049—are within the thresholds typically recommended in the literature (Hu & Bentler, 1999). Additionally, the Chi-square/df ratio of 2.284 falls within the acceptable range of 1 to 3, further validating the model's adequacy (Kline, 2015). These high fit indices and robust factor loadings imply that the model is statistically sound and reliable for explaining the relationships within the principal-agent framework.



**Figure 4.4** Confirmatory Factor Analysis of Principal-Agent Relationships  
 (Source: Researcher, 2024)

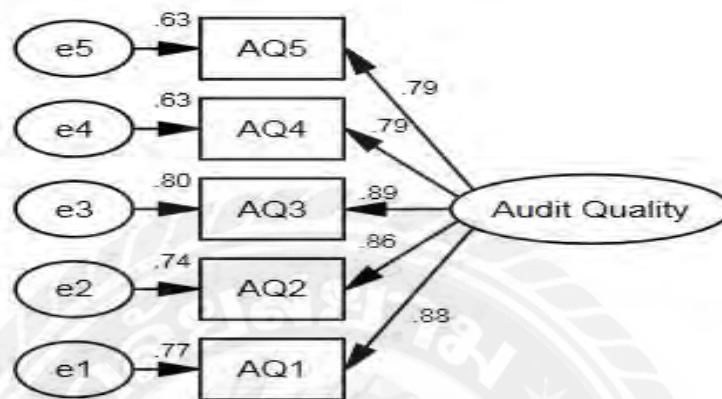
Audit quality is measured using five observed variables, as shown in **Table 4.16**. The AVE value for audit quality is 0.71, exceeding the minimum threshold of 0.50 suggested by Hair et al. (2010), indicating good convergent validity. The CR value of 0.93 also exceeds the minimum standard of 0.70 proposed by Fornell and Larcker (1981), demonstrating consistent internal consistency across the measurement items. These high values indicate that the items reliably and consistently capture the underlying construct of audit quality. Based on these indicators, the audit quality model is theoretically sound and well-supported by empirical data.

**Table 4.16** AVE and CR of Audit Quality

Path Relationship			Estimate	AVE	CR
AQ1	<---	Audit Quality	0.88	0.71	0.93
AQ2	<---	Audit Quality	0.86		
AQ3	<---	Audit Quality	0.89		
AQ4	<---	Audit Quality	0.79		
AQ5	<---	Audit Quality	0.79		

The analysis of factor loadings and model fit for the audit quality model is illustrated in **Figure 4.5**, which depicts the relationships between the observed variables (AQ1, AQ2, AQ3, AQ4, and AQ5) and the latent construct. All observed variables have factor loadings greater than 0.70, suggesting that these observed variables strongly represent the underlying construct of audit quality. According to Hair et al. (2010), factor loadings of 0.70 or higher are generally acceptable, indicating strong correlations between the observed variables and their corresponding constructs. The model fit indices—GFI = 0.990, CFI = 0.996, and RMSEA = 0.054—are within the thresholds typically recommended in the literature (Hu & Bentler, 1999). Additionally, the Chi-square/df ratio of 2.560 falls within the acceptable range of 1 to 3, further validating the model's adequacy (Kline, 2015). These high fit indices and robust factor loadings imply that the model is statistically sound and reliable for explaining the relationships within the audit quality framework.

Chi-square=12.799 df=5  
 Chi-square/df=2.560 p=.025  
 GFI=.990 AGFI=.971  
 CFI=.996 RMSEA=.054



**Figure 4.5** CFA of Audit Quality  
 (Source: Researcher, 2024)

This section comprehensively summarizes the CFA results for five key variables: internal control, informatization, quality of auditors, principal-agent relationships, and audit quality. The analysis shows that all variables exhibit high model fit and reliability. The AVE values for each dimension exceed the minimum threshold for convergent validity, and the CR values demonstrate consistent internal consistency of measurement items. The factor loadings for the observed variables are generally above 0.70, indicating that these indicators effectively explain their respective latent constructs. Regarding model fit, key indices such as GFI, CFI, and RMSEA fall within the recommended ranges. GFI and CFI are above 0.90, while RMSEA is below 0.06, indicating a good fit between the model and the data and that the model adequately reflects the relationships between the latent constructs. The CFA results confirm that the measurement indicators for these five key variables are highly reliable and valid, providing a solid foundation for further empirical research.

### 4.3.3 Correlation Analysis

The correlation analysis of the five key variables—quality of auditors, informatization, internal control, principal-agent relationships, and audit quality—

reveals significant associations. In **Table 4.17**, the  $\sqrt{AVE}$  values for each construct range from 0.794 to 0.843, all of which are higher than the inter-variable correlation coefficients, confirming good discriminant validity. This aligns with the CFA results, which showed that each variable possesses high internal consistency and reliability. The quality of auditors is significantly and positively correlated with internal control ( $r = 0.484, p < 0.01$ ) and audit quality ( $r = 0.481, p < 0.01$ ), indicating that higher-quality auditors contribute to more robust internal control systems and improved audit outcomes. Additionally, there is a moderate correlation between the quality of auditors and informatization ( $r = 0.358, p < 0.01$ ), consistent with the structural robustness shown in the CFA results. The positive correlation between informatization and internal control ( $r = 0.501, p < 0.01$ ) suggests that better informatization practices are associated with more effective internal controls. In contrast, the significant correlation between informatization and audit quality ( $r = 0.471, p < 0.01$ ) indicates that advancements in informatization contribute to better audit results. Internal control has the strongest correlation with audit quality ( $r = 0.546, p < 0.01$ ), emphasizing the crucial role of robust internal control systems in ensuring high audit quality, as previously confirmed by the CFA analysis. Although principal-agent relationships show weaker correlations with other variables, there are still significant positive correlations with internal control ( $r = 0.241, p < 0.01$ ) and audit quality ( $r = 0.210, p < 0.01$ ), suggesting that principal-agent relationships have some influence on internal controls and audit outcomes. Overall, the correlation analysis corroborates the CFA results, demonstrating that the quality of auditors, informatization, internal control, and audit quality are closely related and significantly impact organizational performance.

**Table 4.17** Results of Pearson's Correlation Analysis for Each Dimension

Variables	$\sqrt{AVE}$	Quality of Auditors	Informatization	Internal Control	Principal-Agent Relationships	Audit Quality
Quality of Auditors	0.819	0.819				
Informatization	0.812	0.358**	0.812			
Internal Control	0.794	0.484**	0.501**	0.794		

Variables	$\sqrt{\text{AVE}}$	Quality of Auditors	Informatization	Internal Control	Principal-Agent Relationships	Audit Quality
Principal-Agent Relationships	0.825	0.031	0.070	0.241**	0.825	
Audit Quality	0.843	0.481**	0.471**	0.546**	0.210**	0.843

Note: \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$

#### 4.4 The Structural Equation Models and Hypothesis Testing

In the previous sections, CFA was conducted to ensure that the constructs in the measurement model exhibit robust validity and reliability. The results indicated strong internal consistency and convergent and discriminant validity across all constructs. Following the CFA, correlation and regression analyses further confirmed the interrelationships between the key variables, demonstrating that the measurement model is robust and reliable. As shown in **Table 4.18**, the model fit indicators meet the required thresholds, with Chi-square/df at 2.141, GFI at 0.947, CFI at 0.969, and RMSEA at 0.046, all indicating a good model fit. Notably, the model requires no further adjustments as the fit indices fall within the acceptable ranges. This section will use AMOS software to conduct structural model analysis and hypothesis tests.

**Table 4.18** Model Fit Intercept(N=534)

Model fit indicators	Threshold Range	Observed Values
Chi-square		276.191
df		129
Chi-square/df	Below 5, best below 3	2.141
GFI	Above 0.9, 0.8-0.9Acceptable	0.947
AGFI	Above 0.9, 0.8-0.9Acceptable	0.930
CFI	Above 0.9, 0.8-0.9Acceptable	0.969
RMSEA	Below 0.08	0.046

#### 4.4.1 Direct Effect Verification

This section systematically verifies the direct effects of auditor quality, informatization, internal control, and audit quality. Table 4.19 and Figure 4.6 show that all core hypotheses are supported, further revealing significant interactions between the variables. Through direct and indirect paths to internal control and audit quality, auditor quality and informatization confirm the validity of hypotheses H1, H2, H3, H4, and H7. The model fit indices also validate the robustness and applicability of the structural model, with GFI = 0.947, CFI = 0.969, and RMSEA = 0.046, all within ideal ranges, further confirming that the model fits the data well. The model's low Chi-square/df value (2.141) enhances the explanatory power, demonstrating that the model effectively captures the relationships and causal effects between latent variables. The validation is as follows.

First, auditor quality and informatization significantly positively impact internal control. The effect of auditor quality on internal control has an estimate of 0.40 (C.R. = 6.914,  $p < 0.001$ , S.E. = 0.060), indicating that high-quality auditors can effectively improve the execution and effectiveness of internal control. The relatively high C.R. value suggests a significant result, and the low S.E. further supports the estimate's reliability. Similarly, the effect of informatization on internal control is estimated at 0.44 (C.R. = 7.643,  $p < 0.001$ , S.E. = 0.063), highlighting that the application of informatization, particularly in infrastructure and data management, significantly enhances the efficiency and accuracy of internal control. Although the estimate is slightly higher than the effect of auditors on internal control, the S.E. remains within a low range, indicating a stable relationship between informatization and internal control. The paths in Figure 4.6 further clarify these relationships, validating hypotheses H1 and H2. This suggests that the quality of auditors and informatization play crucial roles in internal control.

Second, the direct effect of internal control on audit quality is also significant, with an estimate of 0.32 (C.R. = 4.733,  $p < 0.001$ , S.E. = 0.101), indicating that a robust internal control system significantly improves audit quality. Although the S.E. is slightly higher than other variables, it remains within the acceptable range, confirming the validity of hypothesis H7. Effective internal control not only plays a crucial role in

managing financial risks and operational transparency but also provides auditors with more accurate and reliable data. These data enhance audit quality, ensuring auditors can conduct more precise evaluations based on a more robust internal control mechanism. Thus, internal control plays a crucial role in improving audit quality.

Third, the impact of auditor quality on audit quality has also been confirmed, with an estimate of 0.28 (C.R.=4.966,  $p < 0.001$ , S.E. = 0.087), indicating that high-quality auditors play an important role in improving audit quality. The C.R. and S.E. values for this estimate suggest a high level of significance and reliability, validating hypothesis H3. Auditors not only directly influence audit outcomes through their professional expertise but also enhance overall audit quality by improving the compliance and effectiveness of internal processes. Additionally, the effect of informatization on audit quality is estimated at 0.23 (C.R.= 4.020,  $p < 0.001$ , S.E. =0.094), validating hypothesis H4, demonstrating that the application of information technology contributes to optimizing audit processes and improving audit quality. These findings reveal the multiple pathways through which auditor quality and informatization jointly promote improved audit quality.

Fourth, **Table 4.19** and **Figure 4.6** further confirm the mediating role of internal control in the relationship between auditor quality, informatization, and audit quality. Although auditor quality and informatization directly affect audit quality, their impact through internal control is more significant. By calculating the mediation effect, internal control's indirect effect between auditor quality and audit quality is estimated at 0.13 (C.R. = 3.200,  $p < 0.001$ ), while the indirect effect between informatization and audit quality is 0.14 (C.R. =3.380,  $p < 0.001$ ). These results validate hypotheses H9 and H10, indicating that internal control acts as a bridge in improving audit quality, enhancing the combined impact of auditor quality and information technology on overall audit outcomes.

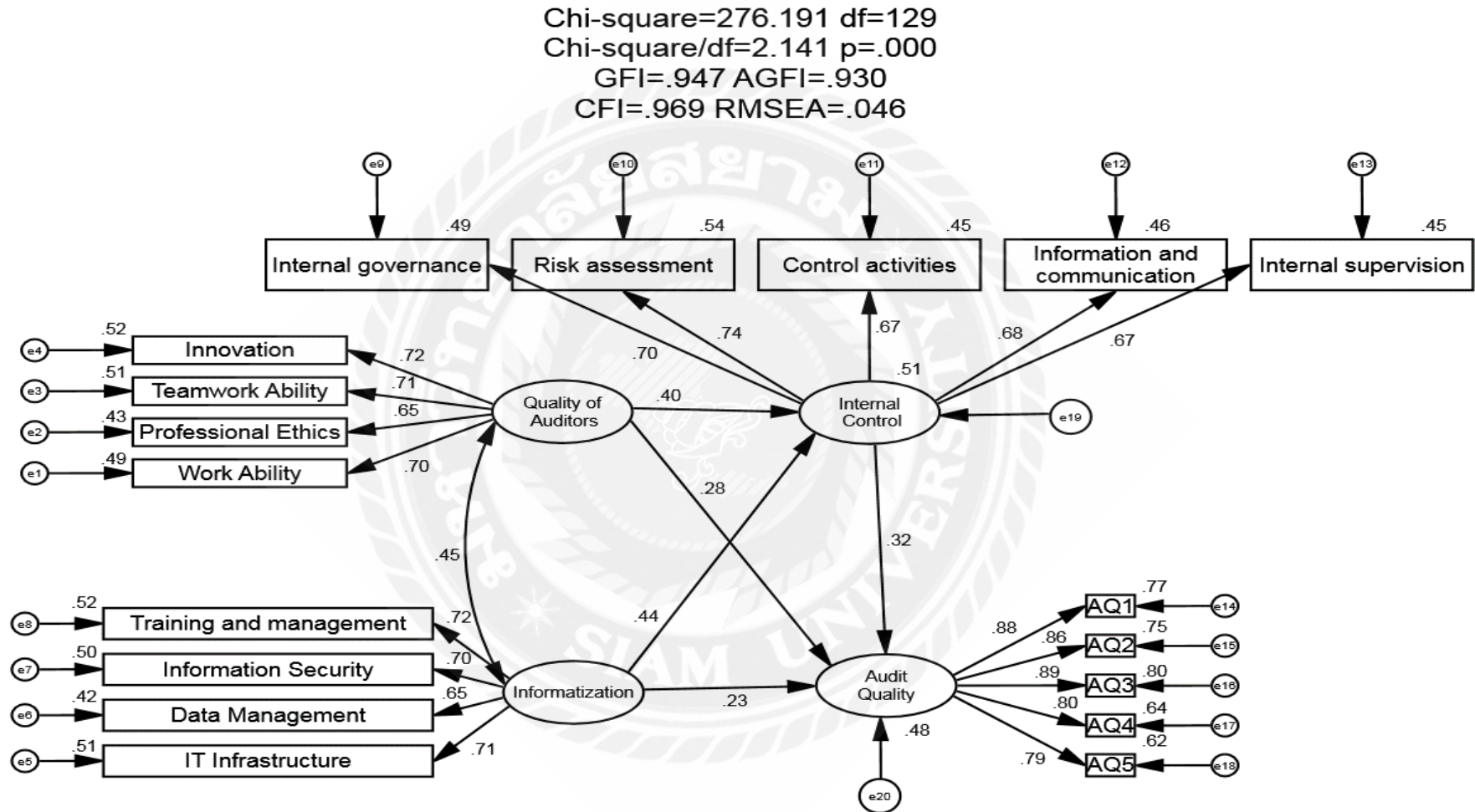


**Table 4.19** Results of Structural Equation Modeling

Path Relationship			Estimate	S.E.	C.R.	P
Internal Control	<---	Quality of Auditors	0.40	0.060	6.914	***
Internal Control	<---	Informatization	0.44	0.063	7.643	***
Audit Quality	<---	Quality of Auditors	0.28	0.087	4.966	***
Audit Quality	<---	Informatization	0.23	0.094	4.020	***
Audit Quality	<---	Internal Control	0.32	0.101	4.733	***

Note: \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$





**Figure 4.6** The Modified Structural Equation Model  
 (Source: Researcher, 2024)

#### 4.4.2 Verification of Moderating Effects

##### 1) Testing the Moderating Effect of Organization Size on the Relationship Between Auditor Quality and Internal Control

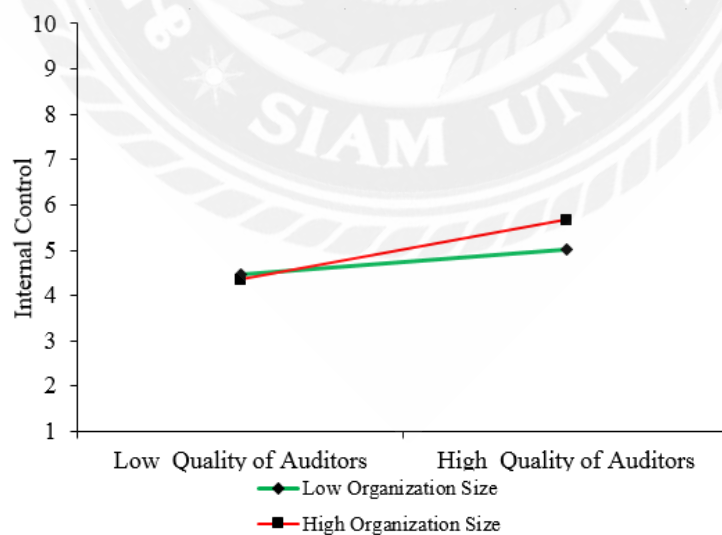
The moderating effect of organizational size was rigorously tested, as presented in **Table 4.20**. First, the independent variable internal control was centralized to minimize multicollinearity's impact on regression results. Then, hierarchical regression analysis was conducted to examine the moderating role of organizational size in the relationship between auditor quality and internal control. The results from Model 1 showed a significant path coefficient for auditor quality, indicating a positive influence of auditor quality on internal control. In Model 2, after adding the moderator variable (organizational size), the path coefficient for the moderator was also significant, and the R-square value increased from 0.234 to 0.251, suggesting that organizational size had an independent positive effect on internal control. Further, in Model 3, when the interaction term between auditor quality and organizational size was introduced, the interaction coefficient was significant ( $\beta=0.186$ ,  $p<0.01$ ), with the R-square rising to 0.303 and an R-square change of 0.069, significantly higher than Models 1 and 2. This result indicates that organizational size positively moderates the influence of auditor quality on internal control, meaning that as organizational size increases, the positive effect of auditor quality on internal control also strengthens.

An interaction effect graph was plotted to validate the moderating effect further, as shown in **Figure 4.7**. The graph reveals that the strength of the positive effect of auditor quality on internal control varies with organizational size. Specifically, in smaller organizations, the positive effect of auditor quality on internal control is less pronounced, whereas in larger organizations, the positive impact is more significant. In summary, this analysis confirms the moderating role of organizational size in the relationship between auditor quality and internal control, supporting the validity of H6.

**Table 4.20** Regression Analysis with Internal Control as the Dependent Variable

	Model 1		Model 2		Model 3	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
Constant	2.667***	14.930	2.298***	11.097	2.226***	11.112
Quality of Auditors	0.464***	12.760	0.461***	12.788	0.471***	13.531
Organizational size			0.130***	3.416	0.135***	3.667
Quality of Auditors× Size					0.186***	6.279
R Square	0.234		0.251		0.303	
Adjusted R Square	0.233		0.248		0.299	
F	F (1,532) =162.813, p=0.000		F (2,531) =88.873, p=0.000		F (3,530) =76.680, p=0.000	
F Change	162.813		11.667		39.430	
R Square Change	0.234		0.017		0.052	

Note: \* p<0.05 \*\* p<0.01 \*\*\* p<0.001



**Figure 4.7** The Moderating Effect of Organization Size on the Relationship Between Quality of Auditors and Internal Control  
(Source: Researcher, 2024)

## 2) Testing the Moderating Effect of Organization Size on the Relationship Between Informatization and Internal Control

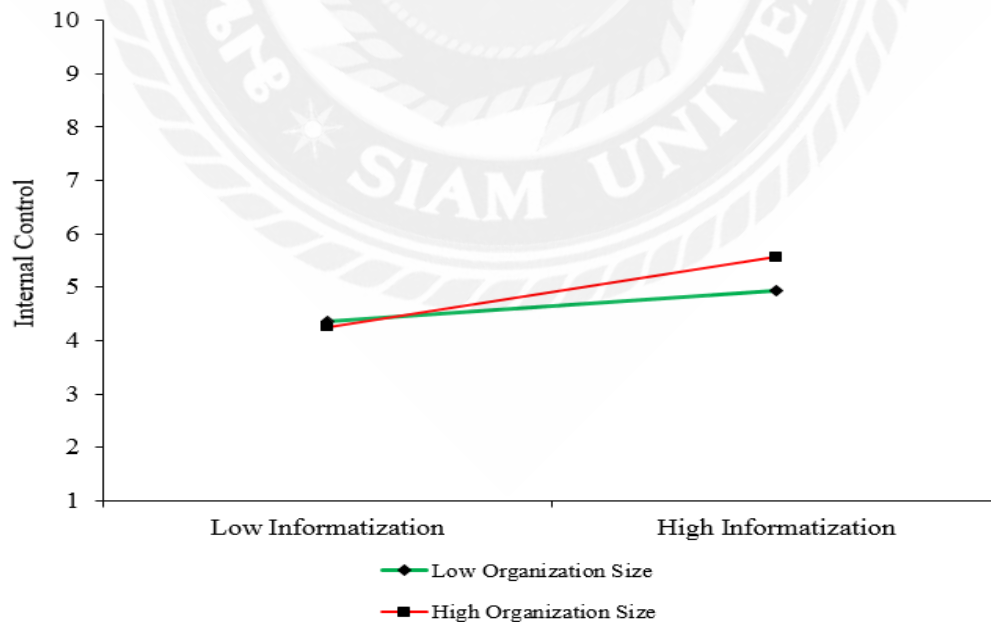
The moderating effect of organizational size on the relationship between informatization and internal control was rigorously tested, as presented in **Table 4.21**. First, the independent variable, internal control, was centralized to minimize multicollinearity's impact on the regression results. Then, hierarchical regression analysis was applied to examine the moderating role of organization size in the relationship between informatization and internal control. The results from Model 4 indicated that informatization had a significant positive influence on internal control ( $\beta=0.502$ ,  $t=13.361$ ,  $p<0.001$ ). In Model 5, after introducing the moderator variable (organizational size), the path coefficient for organization size was significant ( $\beta=0.111$ ,  $t=2.944$ ,  $p<0.01$ ), and the R-square value increased from 0.251 to 0.263, suggesting that organizational size has a positive independent effect on internal control. In Model 6, after introducing the interaction term between informatization and organization size, the interaction effect was significant ( $\beta=0.166$ ,  $t=5.483$ ,  $p<0.001$ ). The R-square value increased to 0.303, and the R-square change was 0.040, higher than Models 4 and 5. This finding indicates that organizational size positively moderates the influence of informatization on internal control, meaning that as organization size increases, the positive effect of informatization on internal control is strengthened.

An interaction effect graph was plotted to confirm the moderating effect further, as shown in **Figure 4.8**. The graph demonstrates that the strength of the positive effect of informatization on internal control varies with organization size. Specifically, in smaller organizations, the positive effect of informatization on internal control is less pronounced, whereas in larger organizations, the effect becomes more significant. This analysis verifies that organizational size moderates the relationship between informatization and internal control, supporting the validity of H5.

**Table 4.21** Regression Analysis with Internal Control as the Dependent Variable

	Model 4		Model 5		Model 6	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
Constant	2.471***	13.343	2.175***	10.387	2.201***	10.792
Informatization	0.502***	13.361	0.495***	13.24	0.478***	13.102
Organization Size			0.111***	2.944	0.124***	3.358
Informatization $\times$ Organization Size					0.166***	5.483
R Square	0.251		0.263		0.303	
Adjusted R Square	0.250		0.261		0.299	
F	F (1,532) =178.526, p=0.000		F (2,531) =94.882, p=0.000		F (3,530) =76.738, p=0.000	
F Change	178.526		8.666		30.064	
R Square Change	0.251		0.012		0.04	

Note: \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$



**Figure 4.8** The Moderating Effect of Organization Size on the Relationship Between Informatization and Internal Control  
(Source: Researcher, 2024)

### 3) Testing the Moderating Effect of the Principal-Agent Relationship on the Relationship Between Internal Control and Audit Quality

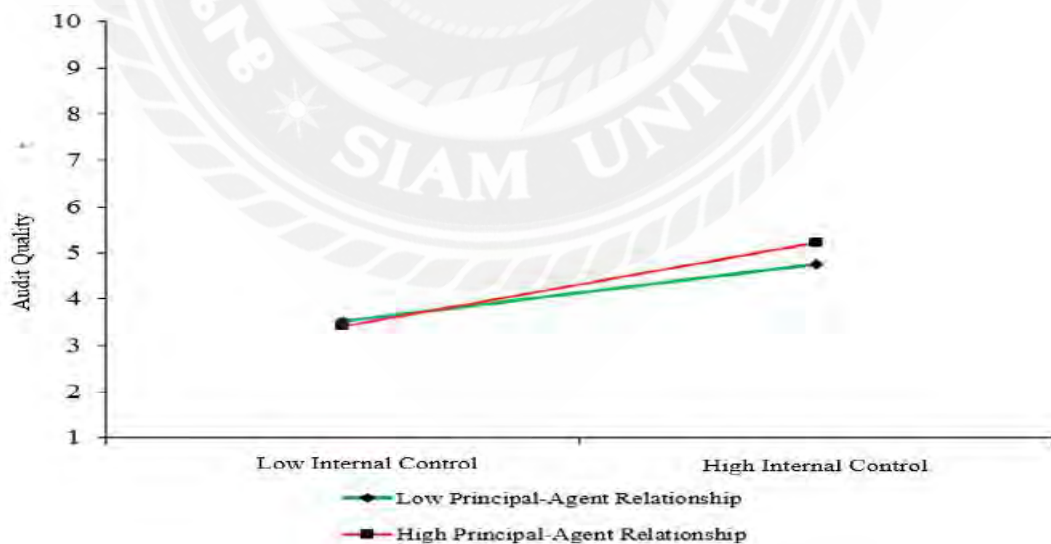
The moderating effect of the principal-agent relationship on the link between internal control and audit quality was rigorously examined, as shown in **Table 4.22**. First, the independent variable, audit quality, was centralized to reduce multicollinearity issues. Then, hierarchical regression analysis was conducted to explore how the principal-agent relationship moderates the impact of internal control on audit quality. The results from Model 7 indicated that internal control had a significant positive effect on audit quality ( $\beta=0.774$ ,  $t=15.05$ ,  $p<0.001$ ). In Model 8, the principal-agent relationship was added as a moderator, and the path coefficient remained significant ( $\beta=0.083$ ,  $t=2.222$ ,  $p<0.01$ ), with the R-square increasing slightly from 0.299 to 0.305. This suggests that the principal-agent relationship itself positively influences audit quality. When the interaction term between internal control and the principal-agent relationship was introduced in Model 9, the interaction effect was significant ( $\beta=0.141$ ,  $t=4.839$ ,  $p<0.001$ ). The R-square increased further to 0.335, with an R-square change of 0.029, demonstrating that the principal-agent relationship significantly moderates the influence of internal control on audit quality.

An interaction graph was generated to validate the moderating effect, as shown in **Figure 4.9**. The graph illustrates that the principal-agent relationship moderates the strength of internal control's positive effect on audit quality. In contexts where the principal-agent relationship is weaker, the effect of internal control on audit quality is less pronounced. However, as the principal-agent relationship strengthens, the effect of internal control on audit quality becomes more significant. This suggests that when the alignment between principals and agents is more substantial, internal control mechanisms enhance audit quality. In conclusion, this analysis supports the moderating role of the principal-agent relationship in the connection between internal control and audit quality, supporting the validity of H5.

**Table 4.22** Regression Analysis with Audit Quality as the Dependent Variable

	Model 7		Model 8		Model 9	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
Constant	0.459	1.779	0.21	0.756	0.041	0.147
Internal Control	0.774***	15.05	0.746***	14.123	0.756***	14.593
Principal-Agent Relationships			0.083**	2.222	0.094**	2.577
Internal Control×Principal-Agent Relationships					0.141***	4.839
R Square	0.299		0.305		0.335	
Adjusted R Square	0.297		0.302		0.331	
F	F (1,532) =226.524, p=0.000		F (2,531) =116.569, p=0.000		F (3,530) =88.798, p=0.000	
F Change	226.524		4.937		24.416	
R Square Change	0.299		0.006		0.029	

Note: \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$



**Figure 4.9** The Moderating Effect of Principal-Agent Relationship on the Relationship Between Internal Control and Audit Quality

(Source: Researcher, 2024)



#### 4.4.3 Verification of Mediating Effects

This study uses the quality of auditors and informatization as independent variables, audit quality as the dependent variable, and internal control as the mediating variable. The Bootstrap method proposed by Hayes (2013) was employed to verify the mediation effect in the model, and the analysis was conducted using the Process plugin in SPSS (Model 4 was selected). A total of 5000 bootstrap resamples were performed with a sample size of 534, and a 95% confidence interval was set to test the significance of the mediation effect. The results are presented in **Table 4.23** and **Table 4.24**, and the specific mediation effect verification results are as follows:

1) Verification of the Mediating Effect of Internal Control Between Auditor Quality and Audit Quality

**Table 4.23** Results of Internal Control Indirect Effects Tests

Path	Effect	SE	t	p	LLCI	ULCI	%
Quality of Auditors - Audit Quality Total Effect	0.67	0.54	12.33	0.00	0.56	0.78	-
Quality of Auditors - Internal Control- Audit Quality Direct Effect	0.38	0.57	6.53	0.00	0.26	0.49	56.7
Quality of Auditors - Audit Quality Indirect Effect	0.29	0.04	-	-	0.25	0.37	43.3

**Table 4.23** shows that the total effect of the quality of auditors on audit quality is 0.67 ( $p < 0.001$ , confidence interval [0.56, 0.78]), indicating a significant positive relationship between the two variables. Further analysis of the mediation effect through internal control reveals that the direct effect of quality of auditors on audit quality is 0.38, accounting for 56.7% of the total effect ( $p < 0.001$ , confidence interval [0.26, 0.49]), while the indirect effect is 0.29, accounting for 43.3% of the total effect (confidence interval [0.25, 0.37]). This result indicates that the quality of auditors not only directly affects audit quality but also indirectly enhances it through internal control.

Based on the path analysis in Figure 4.6, the path coefficient for the positive impact of the quality of auditors on internal control is 0.40 ( $p < 0.001$ ), and the path

coefficient for the influence of internal control on audit quality is 0.32 ( $p < 0.001$ ). Additionally, internal control positively influences audit quality in various ways. These paths further verify the mediating role of internal control in the relationship between the quality of auditors and audit quality, supporting the validity of H9.

## 2) Verification of the Mediating Effect of Internal Control Between Informatization and Audit Quality

**Table 4.24** Results of Internal Control Indirect Effects Tests

Path	Effect	SE	t	p	LLCI	ULCI	%
Informatization - Audit Quality Total Effect	0.65	0.52	12.65	0.00	0.55	0.75	-
Informatization - Internal Control- Audit Quality Direct Effect	0.38	0.54	7.12	0.00	0.28	0.49	58.5
Informatization - Audit Quality Indirect Effect	0.27	0.03	-	-	0.20	0.34	41.5

**Table 4.24** shows that the total effect of informatization on audit quality is 0.65 ( $p < 0.001$ , confidence interval [0.55, 0.75]), indicating a significant positive relationship between the two variables. Further analysis of the mediation effect through internal control reveals that the direct effect of informatization on audit quality is 0.38, accounting for 58.5% of the total effect ( $p < 0.001$ , confidence interval [0.28, 0.49]), while the indirect effect is 0.27, accounting for 41.5% of the total effect (confidence interval [0.20, 0.34]). This result indicates that informatization directly impacts audit quality and indirectly enhances it through internal control.

Based on the path analysis in **Figure 4.6**, the path coefficient for the positive impact of informatization on internal control is 0.44 ( $p < 0.001$ ), and the path coefficient for the influence of internal control on audit quality is 0.32 ( $p < 0.001$ ). Additionally, internal control positively influences audit quality in various ways. These paths further verify the mediating role of internal control in the relationship between informatization and audit quality, supporting the validity of H10.

#### 4.5 Research Hypotheses Testing Results

This chapter used SPSS and AMOS software to analyze the collected data through various statistical methods. Each hypothesis was tested, and the results confirmed the validity of all proposed hypotheses (see **Table 4.25**). The findings demonstrate that auditor quality, informatization, and internal control positively impact audit quality. Additionally, organizational size and principal-agent relationships moderate these relationships, while internal control mediates the effects of auditor quality and informatization on audit quality.

**Table 4.25** Research Hypotheses Testing Results

No.	Hypothesis	Result
H1	The quality of auditors is positively related to the internal control of auditing firms.	Supported
H2	Informatization is positively related to the internal control of auditing firms.	Supported
H3	The quality of auditors is positively related to the audit quality of auditing firms.	Supported
H4	Informatization is positively related to the audit quality of auditing firms.	Supported
H5	Organizational size moderates the relationship between informatization and internal control of auditing firms.	Supported
H6	Organizational size moderates the relationship between auditors' quality and auditing firms' internal control.	Supported
H7	Internal control is positively related to the audit quality of auditing firms.	Supported
H8	The principal-agent relationship moderates the relationship between internal control and audit quality of auditing firms.	Supported
H9	Internal control mediates the relationship between the quality of auditors and the audit quality of auditing firms.	Supported
H10	Internal control mediates the relationship between informatization and the audit quality of auditing firms.	Supported

**H1:** The quality of auditors was positively related to the internal control of auditing firms (Supported Hypothesis).

This hypothesis indicates a positive correlation between auditors' quality and auditing firms' internal control. Carcello et al. (2005) and Yan (2022) validated the conclusions of this study. The quality of auditors is positively correlated with the internal control of auditing firms because their professional competence and ethical standards directly affect their understanding and implementation of internal control. Highly qualified auditors typically possess a more rigorous work attitude, more profound professional knowledge, and more vital communication skills, which enable them to more effectively evaluate and enhance the internal control level of auditing firms, thereby improving audit quality and customer trust. Quality of auditors is divided into four dimensions: workability, professional ethics, teamwork ability, and innovation ability. Auditing firms can enhance internal control in these areas.

**H2:** Informatization was positively related to the internal control of auditing firms (Supported Hypothesis).

This assumption indicates a positive correlation between informatization and internal control of auditing firms. Alzeban and Gwilliam (2014), and Yan (2022) validated the conclusions of this study. There is a positive correlation between informatization and internal control of auditing firms because informatization systems can improve the efficiency and accuracy of internal control. Through informatization technology, auditing firms can achieve automated data processing, monitoring, and reporting, reducing the possibility of human error and manipulation and enhancing the integrity and reliability of data. In addition, informatization systems also provide more powerful audit tracking functions, making it easier for auditors to supervise and audit the implementation of internal controls, thereby improving the efficiency and accuracy of audits. Therefore, informatization can effectively strengthen the internal control of auditing firms, making it positively correlated with internal control.

**H3:** The quality of auditors was positively related to the audit quality of auditing firms (Supported Hypothesis).

This assumption indicates a positive correlation between auditors' and auditing firms' audit quality. DeFond & Zhang (2014) validated the conclusions of this study. The quality of auditors is positively correlated with the audit quality of auditing firms because high-quality auditors usually possess profound professional knowledge, solid

audit skills, and good judgment, which can more accurately identify potential risks and errors and conduct effective audit procedures. Auditors can collaborate with clients and teams and understand their business and internal control environment to more comprehensively assess audit risks and design corresponding audit procedures. Qi (2020) In addition, high-quality auditors often possess strong communication and problem-solving abilities, can effectively communicate with clients and teams, resolve audit issues and disputes, and ensure the smooth progress of audit work. Together, these factors contribute to the improvement of audit quality by auditors, thereby enhancing the audit quality of the entire auditing firm and forming a positive correlation.

**H4:** Informatization was positively related to the audit quality of auditing firms (Supported Hypothesis).

One reason informatization positively influences the audit quality of auditing firms is it can improve the efficiency and accuracy of audits. Han (2021), and Khalil et al. (2015) validated the conclusions of this study. Through informatization systems, auditors can obtain and analyze large amounts of data more quickly, reducing manual data processing time and potential errors. At the same time, informatization systems provide more robust data analysis and audit tracking functions, allowing auditors to have a more comprehensive understanding of the audited entity's business and internal control environment and more effectively identify potential risks and issues. Informatization systems also enhance the efficiency and traceability of auditing, allowing auditors to more easily track every step and decision in the auditing process, thereby improving the quality and reliability of auditing. Applying informatization systems can improve auditing firms' work efficiency and audit quality, resulting in a positive correlation between them and audit quality.

**H5:** Organizational size moderated the relationship between informatization and internal control of auditing firms (Supported Hypothesis).

Organization size indeed impacts the relationship between informatization and internal control of auditing firms. Usually, larger firms may face more complex business environments and data processing needs. Hence, they tend to adopt more advanced and comprehensive informatization systems to support internal controls. Lv & Feng (2011) validated the conclusions of this study. In this case, the informatization

system may directly impact the execution and supervision of internal control, thereby significantly impacting internal control. Smaller auditing firms have simpler business models and fewer data processing requirements, adopting more straightforward and basic informatization systems. In this situation, the impact of informatization systems on internal control is relatively small, and the execution of internal control relies more on manual operations and traditional internal control procedures Wang et al. (2023). Therefore, organizational size can regulate the relationship between informatization and internal control in auditing firms.

**H6:** Organizational size moderated the relationship between the quality of auditors and auditing firms' internal control (Supported Hypothesis).

Organizational size can regulate the relationship between audit quality and internal control in auditing firms. Wang et al. (2023) validated the conclusions of this study. Larger firms typically have more complex business structures and resources and implement stricter and more comprehensive internal control measures to ensure the accuracy and completeness of auditing. In this case, the strength and effectiveness of internal control have a more direct impact on improving audit quality, thus showing a positive correlation. Smaller auditing firms have simpler business models and fewer resources, adopting more straightforward and basic internal control measures. In this case, the impact of internal control on audit quality is relatively small, and audit quality relies more on auditors' personal qualities and skills (Li 2022).

**H7:** Internal control was positively related to the audit quality of auditing firms (Supported Hypothesis).

There is a positive correlation between internal control and the audit quality of auditing firms. Carcello and Nagy (2004) validated the conclusions of this study. A robust internal control system can improve the efficiency and accuracy of audits, reduce audit risks, and ensure that auditors have a more comprehensive understanding of the audited entity's financial condition.

**H8:** The principal-agent relationship moderated the relationship between internal control and audit quality of auditing firms (Supported Hypothesis).

The agency relationship regulates the relationship between internal control and

audit quality of auditing firms. Abbott et al. (2010) validated the conclusions of this study. In this case, the agency relationship refers to the relationship between the management (principal) of the audited entity and the CPA (agent) conducting the audit. When the agency relationship is good, that is, the management is willing to provide sufficient support and informatization, and establish a cooperative relationship with the auditor, the auditor can better evaluate the effectiveness of internal control. They can rely on statements and data from management to gain a more comprehensive understanding of the internal control environment and improve audit quality. When there is a conflict of interest or lack of cooperation in the agency relationship, auditors may face obstacles in obtaining necessary informatization or cooperation from management. Behbahaninia (2024) this may affect their ability to evaluate internal controls, reducing audit quality. Therefore, the strength of the agency relationship can regulate the impact of internal control on the audit quality of auditing firms. A good principal-agent relationship is usually beneficial for improving audit quality, while tense or uncooperative principal-agent relationships may reduce audit quality.

**H9:** Internal control mediated the relationship between the quality of auditors and the audit quality of auditing firms (Supported Hypothesis).

Internal control is an intermediary factor in the relationship between the quality of auditors and the audit quality of auditing firms. Validated the conclusions of this study. The quality of auditors includes their professional competence, skill level, ethical standards, and the correct application of audit methods. In contrast, the audit quality of auditing firms involves the evaluation of the accuracy and completeness of the audited entity's financial reports. Internal control impacts audit quality by influencing the quality of auditors (Chen & Chen, 2024). Reasonable internal control can provide more reliable audit evidence and data, enabling auditors to more accurately assess the financial condition of the audited entity and adopt appropriate audit procedures. Meanwhile, internal control can reduce audit risks and uncertainties, improving audit quality. Therefore, internal control is an essential intermediary in the quality of auditors' and auditing firms' audits. Internal control indirectly affects the audit quality of auditing firms by influencing auditors' understanding and evaluation of the financial condition of the audited entity.

**H10:** Internal control mediated the relationship between informatization and audit quality of auditing firms (Supported Hypothesis).

There is indeed a mediating effect of internal control between the informatization of auditing firms and audit quality. Alzeban and Gwilliam (2014) validated the conclusions of this study. Informatization can improve the efficiency and accuracy of auditing, but whether its impact can be fully translated into audit quality depends on the effectiveness of internal control. Reasonable internal control can ensure the robustness and accuracy of informatization systems, as well as the integrity and reliability of data (Han,2021). This effective internal control can provide auditors with reliable data and informatization, enabling them to more accurately evaluate the financial statements of the audited entity, thereby improving audit quality. Therefore, internal control is a crucial intermediary between informatization and audit quality. It ensures the effectiveness of informatization systems, enabling them to provide reliable data and informatization for the audit process, thereby indirectly affecting the improvement of audit quality.



## Chapter 5

### Research Conclusion, Discussion, and Recommendations

This chapter interprets and summarizes the research results based on data analysis. The structural equation model and hierarchical regression results are sorted to draw conclusions and verify the research hypotheses. Finally, the research results are discussed, and suggestions and future research directions are proposed.

5.1 Research Conclusions

5.2 Discussion

5.3 Practical Implications

5.4 Recommendations

5.5 Research Limitations and Future Research

#### 5.1 Research Conclusion

This section presents how the results have addressed the research questions and, correspondingly, the research objectives. Furthermore, theory-guided explanations are provided for how the results address the research objectives, which testify to the validity of the proposed theories in this study.

**Question 1:** Does the principal-agent relationship moderate the relationship between internal control and audit quality?

The result shows that the principal-agent relationship positively moderates the relationship between internal control and audit quality. The positive is titled higher at a high level of internal control, which signifies that the principal-agent relationship becomes prominent with the more committed level of internal control.

According to principal-agent theory, auditing firms should align their services with the interests of clients, government regulators, and information users to manage inherent conflicts of interest (Keser & Willinger, 2007; Ma et al., 2024). As firms grow, the complexity of their internal control and informatization increases, making establishing robust mechanisms that address these challenges essential. A solid internal

control system that adapts to organizational size and complexity is crucial for safeguarding audit quality, meeting regulatory requirements, and ensuring the reliability of information for users.

**Question 2:** Does organizational size moderate the relationship between informatization, the quality of auditors, and internal control?

The moderating effect of organizational size on the relationship between informatization and internal control is significant. As auditing firms grow, they face greater competitive pressure and increased complexity in managing internal controls and informatization. Leveraging economies of scale through specialization, division of labor, and standardization is essential for improving efficiency and reducing costs. Larger firms require a comprehensive internal control system and advanced information technologies to maintain audit quality. Moreover, continuous investment in technology and auditor training is critical to adapting to the evolving complexities of larger organizations.

**Question 3:** Does internal control significantly mediate the impact of the quality of auditors and informatization on audit quality in auditing firms?

The quality of auditors and informatization have a direct impact on audit quality. High-quality auditors with strong professional knowledge, innovation, and communication skills can better understand a company's internal control systems and identify audit risks, directly enhancing audit quality. Informatization also improves audit efficiency and accuracy while introducing risks such as data security and integrity issues.

The quality of auditors and informatization indirectly impact audit quality through internal control. High-quality auditors enhance the design and execution of internal controls, reducing deficiencies and ensuring reliable audit reports, which improves audit quality. Informatization strengthens the monitoring and execution of control activities by providing timely and accurate data, improving internal control effectiveness, and enhancing audit quality.

**Objective 1:** To observe how the principal-agent relationship moderates the relationship between internal control and audit quality in certified auditing firms in

Beijing.

The research reveals that the principal-agent relationship significantly influences how internal control affects audit quality. In line with the principal-agent theory, auditing firms must manage the inherent conflicts of interest between the firm, clients, and other stakeholders, including regulatory bodies and information users. As firms expand, their operations become more complex, increasing the need for sophisticated internal control systems. Adequate internal controls that scale with organizational growth are essential for ensuring high audit quality, compliance with regulatory standards, and delivering reliable information to end users.

The empirical support for the moderating role of the principal-agent relationship in the interrelationship between internal control and audit quality offers insights into how one understands the logic of the principal-agent theory in explaining the moderations:

First, when principals (clients) are vigilant and clearly understand the audit's value, they can better ensure that agents maintain robust internal controls. This alignment encourages auditors to adhere to high-quality standards because their performance is closely monitored and rewarded based on audit quality. Second, more engaged and informed principals can reduce the information asymmetry between them and the auditors. This enhanced monitoring can incentivize auditors to implement more stringent internal controls, as they know their work will be closely scrutinized. Adequate internal controls thus become more critical in ensuring audit quality when the principal-agent dynamics are actively managed. Third, a well-structured principal-agent relationship often includes contracts that specify performance metrics and quality expectations. These contracts can stipulate the need for rigorous internal controls and high audit quality. When actively involved, principals can enforce these contractual obligations more effectively, improving audit quality.

**Objective 2:** To investigate the moderating effect of organizational size on the relationship between informatization, auditor quality, and internal control.

The findings indicate that the size of an auditing firm considerably moderates the relationship between informatization, auditor quality, and internal control. Larger

firms face more complex operational environments and heightened competitive pressures, requiring advanced internal controls and information technologies to manage these challenges effectively. As organizational size increases, the ability to capitalize on economies of scale through specialization and standardization becomes essential. Moreover, continuous investment in technology infrastructure and auditor training is imperative to meet the growing demands of large-scale operations and maintain audit quality.

The following offers theoretical insights into explaining how the size of auditing firms positively moderates the relationship between informatization (the use of information technology) and internal control. By learning from this study's moderation result, at least four domains of size-related roles in informatization can be explained: economies of size, enhanced expertise and specialization, resource allocation, and operational efficiency. Relating to technology investment through the lens of the economies of size in informatization, larger firms have more significant financial resources, allowing them to invest more significantly in advanced information technology systems. This investment enhances their informatization efforts, improving their internal control mechanisms. For example, large firms can afford sophisticated software and systems that streamline internal control processes and improve efficiency. Related to specialized knowledge, larger firms often employ specialists proficient in managing complex IT systems and internal controls. Their size allows them to attract and retain top talent in IT and internal control domains, leading to better implementation and management of informatization efforts. This specialized expertise helps in creating more robust internal control systems. There is also a resource allocation domain. Large auditing firms benefit from better resource allocation due to their size. By leveraging their informatization efforts, they can allocate resources more effectively to improve internal controls. For instance, they can spread the cost of IT infrastructure and training over a more extensive client base, making it more economically feasible to implement and maintain high-quality internal control systems. Auditing size also has a positive influence on operating efficiency. The auditing firm's size often leads to greater operational efficiency, which can enhance the integration of informatization into internal control processes. Larger firms can streamline and automate control processes more effectively, thanks to their ability to deploy and

manage advanced IT systems on a larger scale.

Concerning the moderating impact of auditing firm size on the relationship between auditor quality and internal control, larger firms have more substantial financial and human resources than smaller firms. This allows them to invest more in auditor training and development, directly affecting auditor quality. High-quality auditors, in turn, contribute to more robust internal control systems. The larger size of the firm enables better resource allocation towards maintaining and improving auditor quality and internal control practices. Furthermore, larger firms can afford advanced auditing and internal control technologies, such as sophisticated data analytics and automated control systems. These technologies enhance the effectiveness of auditors by providing better tools for detecting issues and maintaining controls. The firm's scale allows it to amortize the cost of these technologies over a more extensive client base, making such investments more economically feasible and impactful. Larger firms can employ and retain highly specialized professionals who are experts in audit quality and internal controls. They often have dedicated teams for training and development, ensuring auditors stay updated with the latest standards and practices. This specialization improves both auditor quality and the effectiveness of internal controls. In addition, with larger firms, firms can develop and refine internal processes more efficiently. Larger firms often have established systems and protocols for managing audit quality and internal controls. This operational efficiency allows them to effectively implement high-quality audit practices and robust internal control systems.

**Objective 3:** To evaluate the effects of internal control, auditor quality, and informatization processes on audit quality in certified auditing firms in Beijing.

The study underscores the pivotal role of internal control, auditor quality, and informatization processes in shaping audit quality. Highly skilled auditors with a deep understanding of professional standards, innovative approaches, and communication proficiency significantly improve audit outcomes by efficiently identifying audit risks. Additionally, informatization enhances audits' speed and accuracy but introduces data security concerns. The research further confirms that internal control mediates the effects of auditor quality and informatization on audit quality. A well-established internal control system, with highly trained auditors and advanced information

technology, strengthens audit quality by producing more reliable reports.

## **5.2 Discussion**

This section positions the study's results in the context of the bodies of knowledge relating to the impact of internal auditing on audit quality, which integrates three theories: systems management theory, economic size theory, and principal-agent theory. Three separate discussion subsections relate to the moderating roles of the principal-agent relationship, auditing firm size, mediating effect of internal control, and auditor quality and informatization factors.

### **5.2.1 The Moderating Role of Principal-Agent Relationship on Internal Control and Audit Quality of Auditing Firms**

In this study, the principal-agent relationship is crucial in understanding how internal control affects audit quality within auditing firms. According to principal-agent theory, when the relationship between principals (clients or shareholders) and agents (auditors) remains independent and unaffected by the principal, auditors can perform their duties more effectively, leading to higher audit quality (Jensen & Meckling, 1976). This independence allows auditors to exercise objectivity and impartiality, essential in ensuring that audit assignments adhere to professional standards and regulations (Behbahaninia, 2024).

The principal-agent relationship should also be subject to external supervision and control by the government and other regulatory authorities, as this ensures that auditors maintain their independence and rigorously follow auditing standards (Abbott et al., 2010). Government oversight helps mitigate conflicts of interest between auditors and clients, ensuring that audit processes remain impartial. A well-regulated principal-agent relationship is critical for maintaining the integrity of the audit and internal control system. In such cases, auditors can deliver accurate and reliable audit reports, which enhances internal control effectiveness and overall audit quality (Carcello & Nagy, 2004).

Moreover, when the principal-agent relationship is solid and objective, auditors can rigorously perform their duties without interference from the principal. This

relationship fosters trust and cooperation between auditors and clients, allowing for more effective evaluation of internal controls and improved audit outcomes. However, if the relationship is strained or compromised by conflicts of interest, auditors may face challenges in obtaining the necessary information, leading to decreased audit quality (Eisenhardt, 1989).

These findings align with prior research, confirming that a strong, independent principal-agent relationship enhances the effectiveness of internal controls and audit quality. Conversely, when auditors face resistance or lack of cooperation from management, the audit process becomes more complicated, and additional procedures may be required to mitigate risks related to information asymmetry (Chen et al., 2022). This increases the time and cost of conducting audits, which could ultimately reduce audit efficiency and quality.

### **5.2.2 Organizational Size Moderating Effect on The Relationship Between Informatization and Internal Control of Auditing Firms**

#### **1) The Moderating Role of Auditor Quality, Informatization, and Internal Control in Large Firms**

Large auditing firms, leveraging their significant financial and technical resources, can implement advanced informatization tools on a large scale, such as cloud computing, big data analytics, and artificial intelligence, significantly improving the quality of internal controls while enhancing audit efficiency and accuracy. Large firms are more capable of attracting highly qualified auditors than medium and small firms. These auditors typically possess extensive professional knowledge and skills, enabling them to quickly adapt to new auditing technologies (Ditkaew & Suttipun, 2023). Combining high auditor competence and advanced informatization systems allows large firms to reduce human error and improve operational efficiency through data automation and process standardization. For instance, DeFond and Zhang (2014) found that high-quality auditors in large firms can better utilize informatization tools to identify potential risks in financial statements, thereby ensuring audit quality.

Informatization systems also provide large firms with enhanced real-time data monitoring capabilities and cross-departmental collaboration tools, helping to improve

transparency and consistency in internal controls. By implementing systems such as enterprise resource planning (ERP) and blockchain technology, these firms can reduce the risk of financial data manipulation and ensure data integrity (Li, 2023). These highly integrated systems help large firms standardize their internal control processes across multiple locations, ensuring operational consistency and reducing errors. Informatization technology also plays a crucial role in helping firms navigate complex regulatory environments, ensuring compliance with various laws and regulations, thus enhancing internal controls' quality and efficiency. Therefore, with their ability to integrate advanced informatization systems, large firms have a distinct competitive advantage in addressing audit complexity, internal control challenges, and compliance requirements.

Economies of scale also provide a significant advantage to large firms. Due to their higher volume of business, these firms can spread the implementation and operational costs of informatization systems across a more extensive base, thereby significantly improving their return on investment (Stigler, 1958; Wang et al., 2023). This scale effect enables large firms to standardize their audit processes globally, maintaining high-quality audits and efficient operations. Additionally, large firms' high levels of informatization and standardization enhance their risk management capabilities, allowing them to proactively identify potential risks in complex business and audit environments and take corrective actions swiftly to ensure the accuracy and efficiency of their audit work. Moreover, as the firm's scale expands, its internal control systems become more complex. Research indicates that large firms must adopt more sophisticated informatization systems to manage these challenges, automating repetitive tasks such as data entry and report generation to reduce human error and improve the reliability of information (Brandas et al., 2013; Han, 2021).

## 2) The Moderating Role of Auditor Quality, Informatization, and Internal Control in Medium-Sized Firms

Medium-sized firms, while lacking the vast resources and technological capabilities of larger firms, can still effectively enhance their internal control and audit quality by leveraging the professional abilities of their auditors and making targeted investments in informatization tools. These firms are often more flexible in their



operations, allowing them to choose cost-effective technology solutions that align closely with their specific needs and budget constraints. Cloud computing software, electronic document management systems, and essential data analytics platforms are commonly adopted to improve audit efficiency and accuracy (Khalil et al., 2015). These informatization tools help medium-sized firms streamline their audit processes, reducing manual errors and improving the speed and precision of data handling. Auditor quality plays a pivotal role in maximizing the benefits of these technologies, as auditors with strong technical skills are better equipped to utilize these tools to enhance internal control and audit outcomes. High-quality auditors can extract the maximum potential from these technologies, ensuring that internal controls are both effective and efficient, even within the resource limitations that medium-sized firms face (Ditkaew & Suttipun, 2023).

Additionally, the professional capabilities of auditors in medium-sized firms are critical in ensuring that informatization investments are fully leveraged. Given the smaller teams in medium-sized firms, the expertise and experience of individual auditors have a more pronounced impact on audit quality. High-quality auditors can utilize their expertise to optimize informatization tools, effectively managing and monitoring internal controls. Medium-sized firms often implement internal training programs to continually improve the technical skills of their auditors, ensuring that they can stay updated with technological advancements and regulatory changes. While medium-sized firms may face limited resources and client concentration challenges, they can mitigate these issues by adopting practical and high-impact informatization solutions that fit their operational needs (Brandas et al., 2013; Han, 2021). This pragmatic approach allows medium-sized firms to enhance their internal control systems without overextending their financial capabilities, positioning them to remain competitive in a dynamic marketplace. Combining the flexibility of decision-making with the targeted application of resources enables medium-sized firms to maintain a high level of audit quality, even as they navigate the complexities of modern auditing environments.

3) The Moderating Role of Auditor Quality, Informatization, and Internal Control in Small Audit Firms

Despite resource limitations, small audit firms, particularly those acquiring advanced information systems and highly qualified auditors, can still significantly enhance their internal control and audit quality through innovation and flexible business models. Unlike large firms, small audit firms may not have the capacity for large-scale technological investments, leading them to rely more on the personal skills of auditors and manual processes. However, small audit firms can optimize their internal control processes through efficient resource allocation and selective use of information technology. For example, customized audit software and modular audit tools allow small firms to adjust system functionalities based on client needs, enabling efficient audit operations at lower costs. IT tools also enable small firms to automate critical areas such as client management, data collection, and compliance checks, reducing human error and improving overall efficiency (Brandas et al., 2013; Han, 2021). Despite their limited resources, these technological applications can significantly enhance the standardization of internal controls, allowing small firms to maintain high accuracy when handling complex data.

Another effective strategy for small audit firms is to leverage industry collaborations and network support to supplement their internal resources. Small firms can collaborate with technology providers to access advanced IT tools or join industry associations and collaborative platforms to share auditing technologies, IT resources, and best practices (Alzeban & Gwilliam, 2014). By regularly participating in industry workshops and technology training sessions, small firms can ensure their auditing teams are equipped with the latest IT skills and can exchange experiences and strategies with other firms, further improving the quality of their audit work. Additionally, the flatter organizational structure of small firms allows them to quickly respond to market changes and technological advancements, making them more agile in adjusting business processes and adopting new audit methods. For instance, by integrating cloud computing and mobile work platforms, small firms can implement remote auditing and real-time data sharing, which boosts productivity while ensuring data security and audit transparency. In this process, highly qualified auditors can maximize the effectiveness of the available technologies by using their professional judgment to offer tailored audit solutions, ensuring both high quality and reliability. Through flexible IT applications, efficient resource management, and industry collaboration, small audit firms can

overcome resource constraints, improve their auditing capabilities, and maintain a competitive edge in the market.

### **5.2.3 The Effect of the Quality of Auditors and Informatization on Internal Control and Audit Quality of Auditing Firm**

#### **1) The Impact of Internal Control on Audit Quality**

The quality of auditors and informatization are two crucial factors that significantly contribute to improving audit quality, particularly in strengthening internal control systems. High-quality auditors possess extensive professional knowledge, practical experience, and innovative abilities, ensuring the rigorous execution of audit procedures and effective risk management, thus directly enhancing audit quality. These auditors are skilled in understanding the complexities of client's business operations and internal control systems, identifying weaknesses and potential risks in these systems, and ensuring the reliability of audit reports. In this context, auditors' professional judgment and skills are critical, as they must navigate dynamic and complex environments while balancing audit processes with internal control requirements. Through the use of informatization systems, auditors are better equipped to manage these complexities, reduce the risk of human error, and ultimately ensure the improvement of audit quality (Weber, 2010).

As informatization technologies advance, the role of auditors in internal control becomes increasingly vital. By integrating these systems into audit procedures, high-quality auditors can more effectively respond to complex auditing environments, enhancing the transparency of internal controls. These technologies allow auditors to identify, analyse, and address control deficiencies more efficiently, reducing the risk of errors during the audit process. Automated tools also enhance data processing accuracy, enabling auditors to focus on higher-level analyses and decision-making. Advanced informatization systems provide auditors with real-time monitoring capabilities, allowing for more timely and accurate risk assessments and adjustments during the audit process.

#### **2) Direct Impact of Auditor Quality on Audit Quality**

High-quality auditors influence audit quality through their professional skills

and judgment. Not only do they strictly adhere to audit standards, but they also use their extensive experience to optimize audit processes. For example, experienced auditors can design more effective audit strategies, tailoring procedures to a client's risks to ensure comprehensive audit coverage. Their expertise allows them to predict risks more accurately, adjusting audit strategies to address potential issues that may impact financial reporting. Research shows that the high-level expertise of auditors directly enhances audit quality. DeFond and Zhang (2014) found that auditors with high professional standards can identify financial reporting issues early in the audit process, preventing significant errors or fraud in audit reports. These skilled auditors also utilize advanced audit software and technologies to assess the design and functioning of internal controls, ensuring the effectiveness of these measures and improving the accuracy and reliability of audit reports. Auditors now not only rely on traditional skills but must also master emerging technological tools, such as audit software, to address the complexity and dynamic nature of today's auditing environment.

Auditors with high professional standards can provide tailored audit solutions to meet diverse client needs. Their expertise in audit software enhances their ability to detect risks, while automated tools help them streamline routine tasks. This combination of technology and judgment significantly boosts audit quality, allowing auditors to provide more thorough and reliable assessments.

### 3) Indirect Impact of Auditor Quality on Audit Quality Through Internal Control

In addition to directly influencing audit quality, high-quality auditors indirectly improve audit quality by enhancing internal control systems. Auditors with solid judgment, ethical standards, and communication skills are crucial in improving internal control processes. They provide valuable insights into the design of internal controls and monitor their implementation to ensure consistency and effectiveness. By optimizing the design and execution of internal control systems, these auditors help reduce weaknesses in the system, thereby improving the accuracy of audit reports. Experienced auditors can quickly identify deficiencies in internal controls and offer management recommendations for improvement. This proactive approach strengthens internal control systems and indirectly enhances audit quality by reducing potential errors and fraud risks. Lennox and Wu (2022) highlighted that technically proficient

auditors are more accurate in identifying control activity deficiencies that could affect audit reports' integrity. By improving the effectiveness of internal controls, high-quality auditors ensure that audit findings are based on more reliable and accurate information, thus improving audit quality.

High-quality auditors, when using audit software, can minimize the risk of errors caused by manual operations and enhance the accuracy and efficiency of data processing through automated tools. This combination of technology and auditor expertise allows for more in-depth analyses and judgments, improving audit quality. Audit software, such as data analysis platforms and risk monitoring tools, enables auditors to monitor the execution of internal controls in real time, taking immediate corrective action when issues arise and reducing delays and errors in the audit process.

#### 4) Direct Impact of Informatization on Audit Quality

Informatization, the introduction of advanced technologies into the audit process, has also had a direct impact on improving audit quality. The application of data analysis, AI, and automation technologies has made data processing in audits faster and more accurate, reducing the risk of human error. For example, AI and machine learning can quickly process vast amounts of data, identifying anomalies or patterns that may signal potential fraud or risk, allowing auditors to focus on more complex analyses and judgments. Jeppesen (2007) emphasized that informatization enhances auditors' ability to access, process, and analyze data, thereby improving audit quality. Technologies such as blockchain and ERP systems ensure the transparency and security of audit data, providing auditors with a more reliable foundation of information. These technologies not only automate repetitive tasks, such as data entry and reconciliation but also free up auditors' time to focus on higher-value activities, such as risk assessment and professional judgment. By increasing the efficiency and precision of the audit process, informatization directly enhances audit quality.

In addition, using informatization tools, particularly audit software, helps auditors manage complex data more effectively and generate reports quickly. These technologies allow auditors to access and analyze large datasets more quickly, enabling them to complete more complex audits in a shorter time frame. Automated audit systems allow auditors to detect and correct potential issues in real-time, ensuring the

accuracy and compliance of financial statements. Moreover, these tools improve the traceability of audit work, ensuring the transparency of the audit process, which enhances the credibility of external audits.

#### 5) Indirect Impact of Informatization on Audit Quality Through Internal Control

Informatization also indirectly improves audit quality by enhancing internal control processes. Advanced technologies, such as audit software and automation tools, enable real-time monitoring of internal control processes, more precise data collection, and faster anomaly detection. These tools increase the transparency and consistency of internal controls, helping auditors better oversee compliance and ensure the reliability of financial statements. For instance, ERP systems integrate various business departments and processes into a single system, allowing auditors to access critical data in real-time. This enables auditors to continuously evaluate the effectiveness of internal controls and quickly respond to any issues that arise. Lamboglia and Mancini (2021) pointed out that informatization systems provide companies with robust internal control frameworks through comprehensive data management, risk assessment, and compliance monitoring tools, helping auditors verify the execution of control activities and ensuring their effectiveness.

The application of informatization also supports the standardization of control processes across departments and regions, ensuring the consistent implementation and oversight of controls. Standardization reduces the errors or inconsistencies in audit reports caused by data discrepancies, improving the efficiency of the audit process. Through informatization systems, auditors can access more accurate and timely data, enabling them to adjust audit strategies based on real-time information quickly, significantly enhancing audit quality. In this process, audit software is crucial. Automated data processing tools allow auditors to generate reliable audit reports quickly and reduce the time spent on data analysis, further improving audit efficiency.

Informatization's impact on audit quality, directly and indirectly, demonstrates how integrating advanced technologies with internal control and audit procedures can lead to more effective and accurate audits. The continuous development of these technologies will likely enhance audit quality, enabling auditors to tackle increasingly complex financial environments with greater precision and reliability.

### 5.3 Practical Implications

This section offers numerous practical implications.

Firstly, based on partial government regulation, auditors with higher expected abilities from clients provide services. In strengthening supervision and participation, clients should actively supervise the audit process and engage with auditors. This includes setting clear expectations and maintaining regular communication. By doing so, clients can influence auditors to adhere to high-quality standards and ensure strong internal controls are in place. In addition, auditors should recognize the importance of maintaining strong internal controls and high audit quality, especially when clients are actively involved and monitoring their work. Relating to performance-based incentives, auditing firms might consider implementing performance-based incentives for their auditors that align with high audit quality standards. This could include bonuses or career progression based on meeting specific quality metrics and maintaining strong internal controls. During the contract negotiation between clients and auditors, incorporating detailed clauses emphasizing the importance of internal controls and audit quality can benefit contract design. Clearly defined performance metrics and penalties for non-compliance can help auditors adhere to high standards. Last but not least, about the moderating role of the principal-agent relationship, continuous training and development in internal control practices and audit quality standards should be encouraged. This helps keep auditors updated with best practices and emerging trends, which can positively influence audit quality.

Auditing firm size moderation on informatization can also offer many practical insights, such as those related to strategic investments in informatization, talent acquisition and training, resource management, and process optimization.

Regarding strategic investment in technology, larger-sized auditing firms have an advantage in the strategic investment in advanced information technology systems to enhance their internal control mechanisms. Leveraging these investments effectively can improve operational efficiency and more robust control environments. On the other hand, smaller firms may need to consider forming alliances or partnerships to access similar technological advancements or to scale their informatization efforts cost-effectively. Related to talent acquisition and training, specialized informatization talent

can drive better implementation and management of informatization efforts, thereby strengthening internal controls. Smaller firms might focus on developing targeted training programs for existing staff to enhance their skills in managing informatization and internal controls. They could also consider outsourcing certain IT functions to gain access to specialized expertise without bearing the total cost. Size moderation also has a critical resource management aspect. Large firms can leverage their scale to optimize resource allocation and maximize the benefits of their investments. On the other hand, smaller auditing firms might need to be more strategic about allocating limited resources. Prioritizing key areas where informatization can impact internal control most could help achieve the best results. In process optimization, regardless of auditing firm size, firms should regularly review and optimize their internal control processes in light of new information tools and technologies. Continuous improvement efforts can help maintain strong internal controls and adapt to evolving technology landscapes.

Relating to the firm size moderation on auditor quality, large auditing firms can leverage their scale, provide extensive and continuous training, enhance auditor quality, and improve internal control systems. In contrast, smaller auditing firms may need to seek cost-effective training solutions or partner with larger firms or industry groups to access specialized training and resources. Furthermore, large auditing firms can expand their investment in data analytics, AI audit tools, and other technologies that enhance audit quality and internal control effectiveness. For cost-effectiveness purposes, smaller firms might consider cloud-based solutions or other scalable technologies that provide access to advanced tools without the high upfront costs. Also, larger firms should use their scale to optimize resource allocation and support continuous improvement. Small auditing firms should explore collaborative approaches or seek external support to enhance their capabilities. Last but not least, regarding auditing firm size moderation, large auditing firms should develop niche expertise and maintain high standards to improve audit quality and internal controls further. Smaller firms might need to develop specialized knowledge in-house or consider outsourcing certain functions to firms with the necessary expertise.



## **5.4 Recommendations**

Besides the conclusion, which includes a theoretical understanding of the results, discussions, and practical implications, this section provides recommendations for large, medium-sized, and small auditing firms. These recommendations also incorporate specialized software tools for audit professionals, such as audit command language analytics (ACL), interactive data extraction and analysis (IDEA), audit collaboration efficiency (ACE), office automation software (OA), and ERP, providing practical solutions for different auditing firms.

### **5.4.1 Recommendations for Large Firms**

#### **1) Invest Heavily in Advanced Informatization Systems and Standardize Global Audit Practices**

Large firms have the financial and technological resources to invest significantly in advanced informatization tools. These tools include AI audit systems, blockchain technology, big data analytics, and audit-specific software such as ACL. One critical aspect is using AI software to handle large-scale audit projects. This software is designed to streamline audit workflows, improve data accuracy, and enhance the ability to manage complex audit assignments across multiple locations. By leveraging this tool, firms can maintain consistent audit standards globally, ensuring uniformity and compliance across all regions.

Furthermore, large firms can use ERP to integrate various departments, such as auditing, finance, and ERP, allowing for seamless collaboration across the organization. This type of software centralizes data management and facilitates real-time access to audit information, enabling auditors to perform more efficient risk assessments and respond quickly to emerging issues.

#### **2) Foster Cross-Departmental Collaboration Between IT and Audit Teams**

Collaboration between IT and audit teams is essential for large auditing firms to fully exploit the potential of their informatization investments. IT can facilitate better communication and project management between these departments. This software can help auditors coordinate with IT specialists on cybersecurity, data integration, and system updates, ensuring that technology enhances audit quality without introducing

new risks (Jeppesen, 2007).

In addition, regular workshops and feedback sessions between IT and audit teams will ensure that Audit-specific software and other technologies are continually optimized for evolving audit challenges. These collaborations can also help identify gaps in current systems and drive innovation, allowing the firm to stay ahead of industry standards.

### 3) Enhance Auditor Competency through Continuous Professional Development

Large firms must continuously develop their auditors' professional competencies to maximize the benefits of technology such as Audit-specific software. In particular, auditors need training in traditional audit skills and the effective use of these advanced tools. This can be achieved through certifications, technical workshops, and on-the-job training programs. Audit-specific software also enables firms to track training progress and ensure that auditors are up-to-date on both technical skills and regulatory knowledge (DeFond & Zhang, 2014). By doing so, firms can maintain a team of highly skilled auditors capable of leveraging technology to perform more accurate and efficient audits.

## **5.4.2 Recommendations for Medium-Sized Firms**

### 1) Strategic Investments in Scalable Informatization Tools

Medium-sized firms may not have the budget for large firms' sophisticated systems, but they can still benefit significantly from scalable tools such as IDEA and ERP. These software solutions offer medium-sized firms the flexibility to scale their operations while maintaining the accuracy and reliability of their audits. For example, IDEA allows firms to automate routine audit tasks such as data entry, financial reporting, and compliance checks, reducing human error and improving the speed of audits (Li et al., 2023; Khalil et al., 2015).

In addition, medium-sized firms can benefit from ERP, which helps integrate auditing functions with administrative tasks, improving efficiency. By centralizing audit information and making it accessible to all relevant stakeholders, this software can improve decision-making and allow firms to handle more complex audits with

fewer resources.

## 2) Leverage Flexibility in Adapting Technology and Audit Practices

Medium-sized firms should capitalize on their agility by quickly adopting and customizing technologies like IDEA and ERP to suit their clients' needs. For example, this software offers customizable audit templates that can be tailored to meet the unique regulatory requirements of different industries. Medium-sized firms should also use ERP to streamline communication between auditors and clients, improving workflow and reducing delays in the audit process (Brandas et al., 2013; Han, 2021).

By using these technologies, medium-sized firms can enhance their internal controls while maintaining the flexibility to adapt audit approaches for different clients. This allows firms to maintain high audit quality while managing the increasing complexity of modern financial reporting.

## 3) Continuous Professional Development of Auditors in Specialized Areas

To remain competitive, medium-sized firms should focus on providing their auditors with specialized training that helps them adapt to new technologies and industry standards. By using ACE, firms can easily track auditor training and development, ensuring that auditors are proficient in using tools like ACE. Medium-sized firms should also encourage auditors to specialize in niche areas, such as forensic auditing or environmental audits, which can help the firm differentiate itself from competitors and attract new clients (Ditkaew & Suttipun, 2023).

Comprehensive professional development programs will ensure that auditors are equipped to manage traditional and technology-driven audits, further enhancing the quality of the firm's services.

### **5.4.3 Recommendations for Small Firms**

#### 1) Leverage Low-Cost Informatization Tools for Maximum Impact

Small firms should focus on adopting cost-effective tools like OA and ACE. These solutions allow small firms to automate essential audit functions such as data collection, financial analysis, and reporting at a fraction of the cost of larger systems. ACE can help small firms improve audit accuracy by automating repetitive tasks,

freeing auditors to focus on more value-added activities like risk assessments and financial statement analysis (Brandas et al., 2013; Han, 2021).

In addition, OA provides small firms with the necessary project management tools to coordinate audit engagements, manage client communications, and track progress in real-time. This can significantly improve the efficiency of audits and ensure that small firms can deliver high-quality services even with limited resources.

## 2) Form Strategic Alliances to Access Advanced Technologies

Small firms often face resource limitations that make it challenging to acquire advanced audit technologies or hire top-tier auditors. However, small firms can access shared resources by forming strategic alliances with larger firms or technology vendors. For instance, partnering with technology providers can offer small firms discounted access to ACE and ERP, allowing them to utilize sophisticated audit tools without the high upfront costs (Alzeban & Gwilliam, 2014).

Furthermore, small firms can participate in industry networks or consortiums that offer shared IT infrastructure, training programs, and knowledge exchange platforms. These partnerships can help small firms stay competitive in a market dominated by more prominent players while maintaining high audit quality.

## 3) Develop Auditors with Versatile Skills

Given the small size of their teams, auditors in small firms often need to play multiple roles, ranging from audit execution to client management. Small firms should focus on developing auditors who are proficient not only in traditional audit tasks but also in using advanced tools like ACE et audit-specific software. This versatility allows small firms to offer personalized audit services while maintaining flexibility in adapting to new technologies and market demands (Behbahaninia, 2024).

Additionally, small firms should invest in training that enhances soft skills, such as communication and relationship management. These skills are crucial for building client trust and ensuring audit processes run smoothly. By developing auditors with a broad skill set, small firms can improve audit quality and increase client satisfaction, even in resource-constrained environments.

## 5.5 Research Limitations and Future Research

Although the research process of this study strives to be rigorous, it still has some limitations.

First, due to the limitations of manpower, material resources, and time, this study mainly targets auditing firms in Beijing and does not involve other countries and regions; the objects of this study are auditing firms in Beijing and the representativeness and comprehensiveness of the research sample are insufficient.

Second, although studies have shown that internal control significantly impacts audit quality, many details still need to be studied in depth. For example, do different dimensions of internal control (corporate culture, manager cultural background) have the same impact on audit quality? How do different types of internal control deficiencies impact audit quality? Discussing these issues can further improve our understanding of the relationship between internal control and audit quality.

Third, the audit industry is constantly changing with the development of informatization technology. Future research can focus on the impact of informatization technology on audit work methods, audit methods, and audit quality. For example, how are new technologies such as artificial intelligence and extensive data analysis applied to audit practice? What are the requirements of these technologies for the quality of auditors? Future research can explore the extent to which different quality characteristics of auditors (emotional state, job satisfaction) affect audit quality and how to improve the quality level of auditors through training and education, thereby improving audit quality.

Fourth, the regulatory effect of the principal-agent relationship on audit quality is a research direction worthy of attention. Future research can further explore the impact of different principal-agent relationships on internal control and audit quality and how to establish an excellent principal-agent relationship to achieve a win-win situation. Future research can use new cloud platform technologies from a more in-depth perspective to share audit technology and financial information in real-time and improve the quality of financial information. While reducing agency costs, information synchronization can be achieved to enrich audit and agency theory and practice further.

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**Appendix**



## Questionnaire

### The Effects of Organization Size on Internal Control and Informatization on Principal-Agent Relationships among Certified Auditing Firms in Beijing

#### To Questionnaire Respondent

Hello! Thank you very much for taking part in this research.

This study is anonymous and will be used for academic research only, and the data will be kept strictly confidential. Your participation will remain anonymous. Meanwhile, the second part of this questionnaire uses a seven-point Likert size, which is divided into 1-7 points, from 1 to 7: strongly disagree (1), relatively disagree (2), disagree (3), neutral (4), agree (5), relatively agree (6), and strongly agree (7). Your response has no right or wrong and only reflects your perceptions of the current state of the auditing work and your organization. Therefore, we would like you to fill out the survey fairly and objectively, as your thoughts will help my research. Thanks again!

Mr. Liu Zhan wen, Ph.D. Student  
Siam University

#### **Part 1 Demographic information**

Remark: Please choose by using ✓.

**1. Your gender:** A. Male B. Female

**2. Are you a certified public accountant (including those who have passed the comprehensive examination):**

A. Yes B. No

**3. Your age is:**

A. 25 years old and below B. 26-30 years old C. 31-35 years old D. 36-40 years old E. 41 years old and above

**4. Your highest level of education is:**

A. College and below B. Bachelor's degree C. Master's degree D. Doctoral degree

**5. Your work experience in accountancy:**

A. Below 1 year B. 1-3 years C. 4-6 years D. 7-10 years E. more than 10 years

**6. Your current position:**

A. Junior staff B. Intermediate staff C. Senior staff D. Salaried partner E. Equity partner

**7. The size of your auditing firm's revenue**

A. 10 million Yuan or less B. 10.1 million Yuan- 100 million Yuan C. 1.1 million Yuan to 3 million Yuan D. 1 billion Yuan- 3 billion Yuan E. 3 billion Yuan or more

### **Part 2 Relational factors**

The questionnaire used a Likert scale, ranging from 1 to 7 in which scale 1 indicates strongly disagree (or strongly disagree), scale 2 indicates relatively disagree (or relatively disagree), scale 3 indicates generally disagree, scale 4 indicates neutral, scale 5 indicates generally agree, scale 6 indicates relatively agree (or relatively agree), and scale 7 indicates strongly agree (or strongly agree)

Item	Your Manager/Executive	Alternative Answer						
		1	2	3	4	5	6	7
Internal Control								
1.1	Internal governance							
1	The auditing firm developed a complete internal control system that is suitable for itself.							
2	The staffing of the auditing firm is consistent with the internal control system, and the employee turnover rate is reasonably controlled.							
3	The firm establishes a comprehensive performance appraisal system for internal governance.							
1.2	Risk assessment							
4	The adaptability of the auditing firm's risk assessment system to the set risk assessment objectives.							
5	The risk assessment system of auditing firms is effective in identifying risks.							
6	The auditing firm timely adjusts quality objectives, quality risks, and response measures according to changes in circumstances.							
7	The degree of consistency between the risk assessment results prepared by the auditing firm and the actual risks.							
1.3	Control activities							
8	The auditing firm formulates unified technical standards (such as practice guidelines, examples, manuscript templates, etc.) and quality objectives.							

Item	Your Manager/Executive	Alternative Answer						
		1	2	3	4	5	6	7
9	The auditing firm formulates a reasonable project quality review system, which is effectively implemented.							
10	The auditing firm establishes an accountability system for quality management accidents and effectively implements it.							
1.4	Information and communication							
11	The auditing firm communicates with people at different levels according to business needs, and the communication methods and channels are effective.							
12	Internal and external informatization about the auditing firm's business is disclosed promptly and is true and reliable.							
13	The auditing firm adjusts the informatization and communication mechanism based on feedback issues.							
1.5	Internal supervision							
14	The firm effectively carries out project budget management and personnel delegation management.							
15	Before the issuance of the audit report, assign a dedicated person to implement project quality supervision (three-level review system) strictly.							
16	After the audit report is issued, conduct regular inspections of completed audit projects (inspections of manuscripts and reports, and other informatization inspections).							
17	The auditing firm improves the deficiencies identified during supervision and inspection.							
Informatization								
2.1	IT Infrastructure							
18	The hardware facilities required for informatization investment in auditing firms meet the requirements for informatization.							

Item	Your Manager/Executive	Alternative Answer						
		1	2	3	4	5	6	7
19	The auditing firm is equipped with a professional technical department or a high-level computing team.							
20	Auditing firm continue to invest in the improvement of informatization systems and the development of innovative audit tools.							
21	The auditing firm built a system based on tools such as Hadoop and AI technology to conduct audit work accordingly.							
2.2	Data management							
22	The auditing firm's data management realizes informatization.							
23	The daily work of auditing firms is highly informative.							
24	Informatization improves the data management efficiency of auditing firm.							
2.3	Informatization security							
25	The informatization of auditing firm ensures the security of informatization management.							
26	The auditing firm's informatization system has high security.							
27	Informatization of auditing firm in a secure network environment.							
28	Employees have a strong awareness of informatization security.							
2.4	Personnel training and management							
29	The auditing firm establishes a systematic personnel informatization Personnel Training and Management system.							
30	Auditing firm conduct informatization training for employees on a regular or irregular basis.							
31	The level of informatization and management of auditing firm positions is very high.							
32	Auditors have high informatization quality.							

Item	Your Manager/Executive	Alternative Answer						
		1	2	3	4	5	6	7
Quality of Auditors								
3.1	Work Ability							
33	Among employees, CPAs (including those who have passed the comprehensive examination, ACCA, CIA, USCPA, AIA, and CGMA) account for a relatively high proportion of auditors.							
34	Auditors must have professional competence.							
35	Auditors have strong risk awareness.							
36	Auditors have the learning ability to improve themselves continuously.							
3.2	Professional ethics							
37	The auditing firm will establish a mechanism to meet the requirements of professional ethics standards.							
38	Auditing firm conduct regular and irregular professional ethics training for auditors.							
39	Auditing firm should establish a mechanism to punish employees who violate professional ethics.							
40	Auditors can abide by professional ethics.							
3.3	Teamwork Ability							
41	Auditing firm work is often completed in the form of a team.							
42	Auditing firm have high requirements for the teamwork ability of auditors.							
43	Auditors have good interpersonal communication skills.							
44	Auditors can help each other and complete tasks together.							
3.4	Innovation Ability							
45	Auditing firm encourage employees to innovate.							
46	Auditing firm often hold seminars on auditing.							

Item	Your Manager/Executive	Alternative Answer						
		1	2	3	4	5	6	7
47	Auditors continue to innovate working methods while adhering to professional standards.							
48	Auditors are willing to improve work efficiency through innovation.							
Principal-agent relationships								
49	The principal-agent relationship remains independent and unaffected by the principal.							
50	The principal-agent relationship is objective and impartial, and audit assignments are performed by professional standards and regulations.							
51	The principal-agent relationship is subject to supervision and control by the government and other authorities.							
52	The principal-agent relationship ensures that auditors perform their duties rigorously.							
Audit quality								
53	Your firm has adhered to all relevant auditing standards and legal regulations in its past audit work.							
54	The degree to which the audit process of an auditing firm is subjected to industry supervision.							
55	Auditing firm can effectively manage audit risks.							
56	Auditing firm effectively implements three-level review procedures for audit reports and drafts.							
57	The auditing firm promptly handles the deficiencies identified during supervision and inspection and proposes improvement measures.							

Thank you for your participation in this survey. I wish you a smooth work and a happy life!

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