THE EVALUATION OF THE INTERNAL CONTROL AND RECOMMENDATIONS FOR IMPROVEMENT AT PICC

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ABSTRACT

In recent years, the world economic environment has become increasingly complex and volatile due to various factors. Competition in the insurance industry has also become more and more intense, with more and more risks and challenges. Insurance enterprises have gradually realized that internal control plays a vital role in the development of enterprises. The implementation of effective internal control not only ensures the healthy and stable development of insurance enterprises, but also improves the management ability of enterprises. The main objectives of this study were :1) To establish the internal control evaluation index system of PICC Insurance Company, 2) To conduct a comprehensive evaluation of PICC's internal control and 3) To formulate an optimization strategy for PICC's internal control.

This study was based on the theory of internal control and adopted a combination of qualitative and quantitative research methods. The expert survey method was used to determine the construction of the internal control evaluation index system of PICC. Based on the establishment of grey model, the internal control of PICC was comprehensively evaluated.

This study achieved three results: 1) The internal control evaluation index system of PICC insurance company was constructed, 2) The comprehensive evaluation result of PICC's internal control was 3.05 points, which indicated that its internal control performance was good, and 3) PICC's internal control optimization strategy was formulated from the five elements of internal control.

The research recommendations include: 1) strengthening the risk warning and risk supervision of the whole process of internal control, 2) improving the personnel level of internal control implementation evaluation and internal control periodic evaluation, 3) improving the information transmission mechanism.

Keywords: internal control, gray evaluation, expert survey

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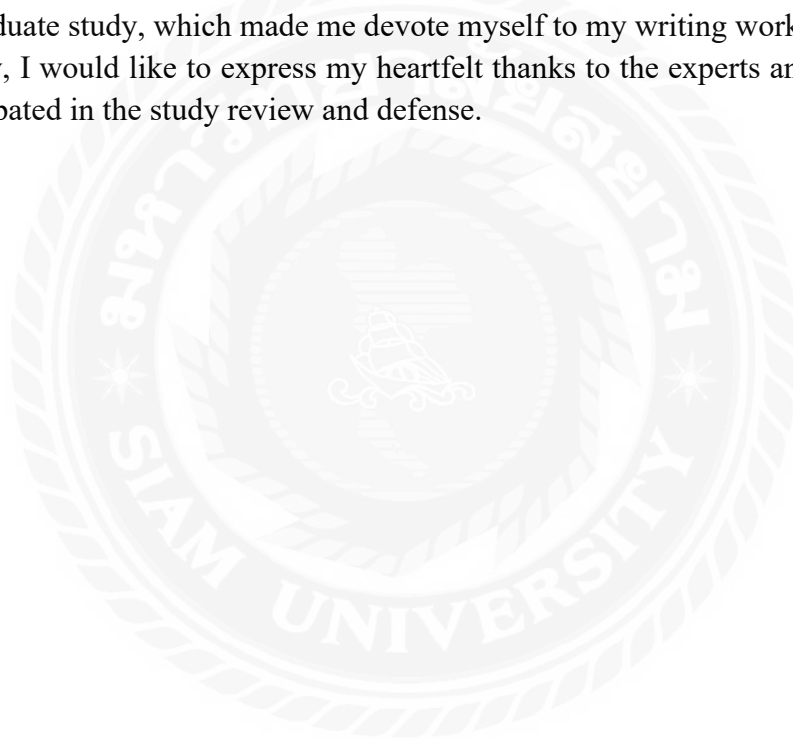
Declaration

I, LIU YUSHAN, hereby certify that the work embodied in this independent study entitled "THE EVALUATION OF THE INTERNAL CONTROL AND RECOMMENDATIONS FOR IMPROVEMENT AT PICC" *is result of original research and has not been submitted for a higher degree to any other university or institution.*

(LIU YUSHAN)
Jun 18, 2024

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Chapter 1 Introduction

1.1 Background of the Study

With the development of economic globalization, the Chinese economy has entered a period of rapid growth. The ever-changing market environment has brought both opportunities and new challenges to all industries. Competition in all industries has been intensifying, especially in the financial industry. Insurance companies, as one of the financial industries, are facing increasingly complex risks under the tremendous pressure of competition in the industry. In recent years, with the advancement of economic system reform, the state has gradually allowed the insurance industry to enter the market, and the number of insurance companies has greatly increased (Paso, 2002). However, in the initial stage, all insurance companies only consider seizing the existing market share and occupying the favorable resources in the market, while neglecting their own management and construction, resulting in weak risk control ability, low level of customer service, and even infringement of consumer rights and interests occurring from time to time.

In order to prevent and control the "sickness" of the internal management of insurance companies, to protect their reasonable and compliant "healthy" development, and to protect the rights and interests of the insured (Hermanson, 2012). The CIRC has issued a series of normative documents such as the Guidelines on Compliance Management of Insurance Companies, the Basic Guidelines on Internal Control of Insurance Companies, and the Circular on Further Strengthening Risk Prevention and Control in the Insurance Industry. It is clearly stated therein that internal control is a crucial part of the risk management system for the development of insurance enterprises. Therefore, insurance companies are gradually realizing that the quality of internal control is the key to the development of the enterprise itself, as well as an important guarantee for the healthy and sustainable development of the enterprise and its continuous growth. A perfect enterprise internal control system can reduce risks and ensure the safety of assets, so as to achieve its own high-quality management and long-term strategic goals. Carrying out effective internal control evaluation is an important prerequisite for the good operation of enterprise internal control (COSO, 1992).

As for the reasons for choosing PICC, the research on PICC is typical of the insurance industry, and the problems of a large number of customers are universal. The subject of this thesis is the People's Insurance Company of China Group Corporation (PICC), which was chosen because PICC is the world's largest insurance company, with more than ten subsidiaries, which cumulatively provides insurance to more than 30 million people. Choosing such a large Chinese insurance company will make the evaluation data more general, and the results can be extended to other similar Chinese insurance companies in the future, and such a large company needs comprehensive internal control evaluation system to help it manage its business and avoid risks.

1.2 Problems of the Study

Expectations of commercial insurance in the current mainstream literature focus on how to improve yields and change portfolios to reduce non-systemic risks, but neglect the ability of insurers to evaluate their business internally and to assume effective supervision of their employees in the course of their work. In addition, insurers often face challenges in ensuring effective communication and coordination between different departments and stakeholders. This can lead to information silos and a lack of transparency, making it difficult to identify and address internal control issues in a timely manner. These factors are equally relevant to the profitability and credibility of insurance companies. Especially in China, where legal loopholes can be easily identified and exploited against the backdrop of inadequate laws in the insurance industry, internal controls of insurance companies are of particular importance.

With a comprehensive internal control assessment system in place, insurance companies can avoid risks arising from their own management, prevent potential pitfalls in their own departments, and gain the trust of their customers as a result of the strong supervision of the insurance company.

1.3 Objectives of the Study

1: Taking the COSO framework as a reference, establish the internal control evaluation index system of PICC through the evaluation table of internal control indexes.

2: Conduct an overall assessment of PICC's internal control using the grey evaluation model.

3: Propose recommendations for improving PICC internal controls.

1.4 Scope of the Study

This study mainly evaluates the internal control of PICC, and makes corresponding optimization suggestions according to the defects found in the evaluation results. This paper takes the five elements affecting the internal control as the core of the evaluation indicators, and obtains experts in related fields (including practitioners in the insurance industry, professors in finance majors, experts and scholars in the field of internal control) to score the evaluation indicators in the form of questionnaires. According to the feedback data information, the internal evaluation weight matrix is established, the gray evaluation method is used to calculate the comprehensive evaluation of internal control, the deficiency of the company's internal control is quantitatively analyzed, and the corresponding optimization suggestions are put forward.

1.5 Significance of the Study

This study developed a detailed internal control system for insurance companies by using the theory of internal control as a basis and combining it with relevant evaluation and analysis models. It provides a new perspective for insurance companies to examine its possible problems in multiple dimensions. The internal control system of insurance companies constructed in this study also makes up for the gap in the mainstream literature on the analysis of internal control of insurance companies.

In fact, the prospect of applying the internal control theory is not limited to a single insurance company, but its usefulness can be radiated to the whole insurance industry. Although the theory in this paper focuses on PICC insurance company, it can be applied to other similar Chinese insurance companies, as the problems are common in the Chinese insurance industry. The benefits of an internal control system for a company are not only in terms of rising earnings, but also in terms of the company's ability to manage and make adequate judgements about internal risks.
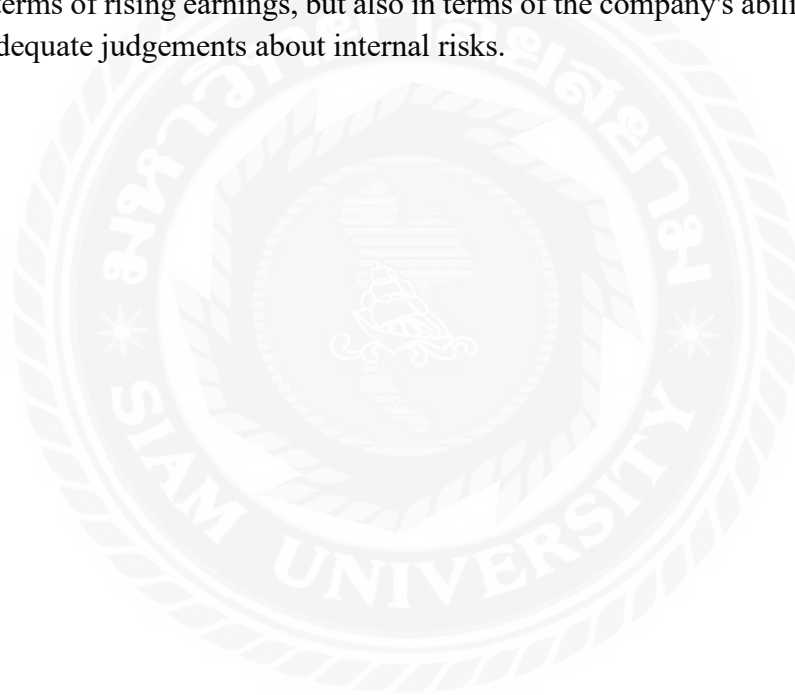
Chapter 2 Literature Review

2.1 Internal control

2.1.1 Internal control evaluation system

The COSO (1992) report proposed for the first time that internal control elements consist of five components: internal environment, internal oversight and control activities, information and communication, and risk assessment. This study designed and constructed an internal control evaluation system, identifying five levels and 93 specific evaluation indicators (COSO, 1992). Hermanson analyzed the level of the first and second level internal control evaluation indicators at different levels (Hermanson, 2012). Leary (2014) argued that the construction of the enterprise internal control evaluation system should not be affected by the internal control framework, but should be more reference to the actual situation of the enterprise and construct an indicator system with multi-factor fuzzy comprehensive evaluation.

Ye (2020) believes that internal control is an important means to strengthen the management of enterprises, and enterprises must establish a perfect internal control evaluation system, so they need to strengthen the supervision of their business management. Xue (2020) takes a municipal industrial and commercial bureau as the research object and constructs an internal control evaluation system from both the unit level and the business level. He adopts the fuzzy comprehensive evaluation method in the application of the evaluation method, and based on the evaluation results to improve the unit's working ability and working efficiency, which can effectively enhance the credibility of the government.

Wu (2020) associated management entropy with internal control, and based on the five elements of the standards related to the basic norms of enterprise internal control, identified five-level indicators, 22 secondary indicators and 64 tertiary indicators according to the actual situation of the enterprise, and established a systematic and comprehensive system of evaluation indicators for the internal control of enterprises. Liu (2020) believes that although China has developed a series of systems and documents on the internal control of administrative institutions, there are still some problems in the actual implementation, and internal control evaluation is the main way for unit leaders to evaluate the effectiveness of internal control. By constructing a perfect internal control evaluation system, the internal control of the enterprise unit can be optimized. He believes that at the present stage of evaluation of internal control evaluation system of enterprise units, there are still evaluation of the independence of the subject is not strong, the lack of evaluation methods, evaluation procedures are not perfect, the implementation of the effect is not good and other problems, should be targeted to solve, and then put forward feasible proposals.

Zhang (2020) argues that the enterprise internal control evaluation system plays a role of self-restraint and standardization for enterprises, but at present, domestic enterprises are too weak in the construction of internal control evaluation system, and it is necessary to strengthen the level of operation and management and risk prevention ability. Ding (2020) suggests that internal control evaluation is a booster for the self-improvement of enterprise internal management system. Attention to strengthening internal control evaluation can not only enhance the market image and public recognition of enterprises, but also achieve coordination and interaction with government supervision. Xu (2020) based on the current situation of Lu County Rural Credit Union, determined the first-level indexes of internal control evaluation, took the five elements of internal control as the second-level evaluation indexes, designed 21 third-level evaluation indexes in line with the actual situation of Lu County Rural Credit Union, and constructed the third-level evaluation index system of Lu County Rural Credit Union's internal control by using the fuzzy evaluation method.

2.1.2 Internal control evaluation method

Shi (2008) takes hierarchical analysis as the core, and the research shows that the evaluation of internal control mainly focuses on the internal environment of the organization. Ramos (2011) proposed a CSA (internal control self-assessment method) method, which can effectively help the company to monitor and evaluate the for the internal control aspect. Hwang (2015) proposed to formulate the internal control evaluation indicators based on the aspects of human resources and corporate culture, and then calculate the weight of the indicators combined with the hierarchical analysis method, and finally obtained the internal control evaluation result. Liu (2015) proposed the IMC performance evaluation method, which can objectively and comprehensively evaluate the IMC performance.

Liu (2021) empirically studied the relationship and mechanism between internal control quality and the company's performance, as well as the heterogeneity of internal control quality on the company's performance under different profit and loss states and different market competition degrees. The results show that the higher the internal control quality, the better the company performance. Sergei (2021) proposed a digital method, using digital technology and developed comprehensive monitoring program, risk-oriented method, formulate orderly suggestions to monitor the external environment, in order to internally control the enterprise procurement process. Alexander research (2022) empirically tested the impact of the internal control system of Ghanaian listed companies on performance and the regulatory role of information technology. Studies demonstrate a significant relationship between the internal control system (control environment, control activities, information and communications) and company performance, as measured by overall profitability. On the other hand, information technology regulates the positive relationship between internal control and enterprise performance.

Chen & Li (2005) studied the weight of internal control evaluation index by using the method of difference maximization. This method was used in the fixed internal control evaluation of commercial banks. Yang (2006) adopted a new evaluation mode in the comprehensive evaluation of enterprise internal control, and used the PDCA cycle theory to realize the self-evaluation of enterprise internal control. Chi (2015) proposed a new method to determine the weight of the enterprise internal control evaluation index, that is, using the assignment method to score the basis of the target-oriented evaluation index and the factor-oriented evaluation index as the evaluation standard, and finally obtained the evaluation result. Liu & Li (2015) selected 20 standard indicators as the standard by using the five influencing factors of internal control, and adopted the maximum combination empowerment method of difference maximization in the calculation of weights. Chen (2015) combined with the relevant ideas of sampling audit and weight change theory, designed a set of methods to quantify the overall level of enterprise risk control, and studied how to integrate this method with the information system.

Li (2019) proposed that the effectiveness of enterprise internal control is an important factor in the development of enterprises, and the internal effectiveness of enterprises is closely related to its evaluation method. At present, there are two internal evaluation methods, the first is the detailed evaluation method, and the second is the risk base method. These two evaluation methods want to promote the effectiveness of enterprise internal control and are inseparable from enterprise management. The risk basis method is more suitable for guiding the management and certified public accountants to conduct internal control.

Liang (2020) proposed that Chinese enterprises face fierce competition at home and abroad, deeply cultivate the domestic market, occupy the industry advantages, and actively expand the international market has become an important development goal of the enterprises. The risk changes faced by enterprises in the innovation transition period are intensified, which brings challenges to corporate governance. If enterprises want to develop steadily, they must be risk-oriented, strengthen internal control, pay attention to internal control evaluation, and promote the continuous improvement of internal control and risk management system. Zhang (2021) believes that the effectiveness of the implementation of internal control, the design is, based on the legal benefits, to meet the actual internal control needs of the enterprise, so as to ensure that the enterprise goals can achieve. Tian (2021) believes that COSO Committee issued the Enterprise Risk Management Strategy and Performance Integration Framework, which can play a certain reference in the research of internal control evaluation. Through the framework structure of ERM, the main process is to establish the system, determine the weight, calculate the score and analysis results and other aspects of the main evaluation process.

2.1.3 Internal control and risk management

Spira (2003) points out the new conceptual definition of internal control, which includes risk management in the internal control, and details the relationship between them. James (2005) puts forward a new risk management framework on the research of internal control risk management. He believes that in the overall process of internal control construction, the concept of risk management is very important, and enterprises need to form the concept of risk management. Annukka (2005) believes that enterprises should improve the ability to resist external risks by starting with from the improvement of their internal control. Eoin & Elm (2006) believe that risk management can not only reduce the probability of risk occurrence by improving the internal control of the enterprise, but also reduce through advanced risk technology.

Wu (2000) believe that the risk control of enterprises needs to improve the relevant content of the five elements of internal control. It takes the control theory as the core, and analyzes the relationship between risk management and internal control. Dong (2015) believes that the fierce competition among enterprises can promote the development of enterprises, but it is necessary to enhance the risk prevention meaning of enterprises, and improve the risk management mechanism of enterprises. Zhang (2015) believes that a reasonable and effective internal control and management system can help state-owned enterprises to gain advantages in the competition, so it is necessary for enterprises to start the risk management work periodically.

Xu (2015) believes that risk management and internal control are inseparable in enterprise management, and the two should be integrated and analyzed. Liu (2017) put forward that under the background of fierce competition, the role of enterprise internal control risk management mechanism is very necessary. If Chinese enterprises want to occupy a place in the complex and changeable market, sustainable, healthy and stable development. The first is to be familiar with and understand the situation of the enterprise, the social and economic development, at the same time, the enterprise must establish a reasonable and efficient internal control and management mechanism. Xie (2018) proposed that small and medium-sized enterprises are an important part of China's economic development, providing a large number of employment opportunities and products and services for China. However, after the implementation of ERP system for small and medium-sized enterprises, the original internal control framework did not make profound changes to the introduction of ERP, resulting in the internal control of small and medium-sized enterprises to produce the corresponding risk.

Xia (2018) explored the internal control problems of the company's vault assets by using the risk management framework of COSO. It shows that the imperfect risk assessment mechanism, irregular control activities, not smooth information communication and other factors will affect its. Ding (2018) believes that the relationship between internal audit, internal control and risk management is particularly

important. In order to reduce the probability of risk occurrence, enterprises need to deal with the relationship between the three factors. Cai (2019) takes commercial banks as the research object, which shows that the key to the stable operation of commercial banks is to pay attention to the implementation of risk evaluation] when carrying out internal control evaluation. Fu (2019) believes that internal control and risk management are interdependent, and they have their own influence elements. Feng (2020) enterprises in the process of management development should update the management idea, not only should attach importance to the enterprise economic benefit management, but also attach importance to the enterprise internal control management, deep understanding of internal control for the significance of enterprise development in our country, enhance the level of internal control management, realize the sustainable development of modern enterprise. Li (2021) took the construction enterprise as the research object and explored the importance of internal control for its development. The results show that the internal control of many construction enterprises is not well implemented.

Li (2021) thinks internal control risk prevention for the development of the enterprise has important practical significance, can effectively avoid the risk of the enterprise, improve the ability to solve the problem of management enterprise, also can plan the enterprise management, establish sustainable development goals, in order to promote the healthy development of enterprise. Ma (2021) studied the principle of building the internal control system under the risk management, and constructed the internal control system from two aspects: the problems existing in risk management and the improvement of risk management measures. Yan (2020) proposed that enterprises must comprehensively investigate the development trends and trends of the market, and make detailed analysis of the risks in their own management process, and must carry out good evaluation work in the internal, to ensure that the internal control level can be improved to the maximum extent.

Wang (2021) believes that the innovative internal control programmed of state-owned enterprises is not only conducive to the restructuring of state-owned enterprises in China, but also a key measure to promote the improvement of China's comprehensive national strength. He evaluates the internal control risks of enterprises based on the fuzzy comprehensive evaluation method, transforming qualitative evaluation into quantitative evaluation, and using fuzzy mathematics to evaluate matters subject to multiple factors as a whole, which better solves the problem of quantitative evaluation of risk management.

2.1.4 Five elements affecting internal control

2.1.4.1 Control environment

The internal control environment, which is the basis for the other elements of internal control, is mainly concerned with creating an atmosphere in the enterprise, the

core of which is to control the influence of the internal environment on the personnel of the enterprise through the establishment of an enterprise culture, the principle of honesty and morality, the allocation of responsibilities and delegation of authority to personnel, the management philosophy and management style of management personnel, and the human resources system, and so on in a number of ways. These elements have a direct or indirect impact on the implementation of corporate profit strategy objectives (Bulgakov, 2022). The creation of a positive atmosphere for employees within the enterprise through the active construction of the internal environment of the enterprise, which is conducive to the enhancement of the employees' sense of control, has a crucial impact on the strategic layout of the enterprise's sustainable development.

2.1.4.2 Risk assessment

Any enterprise will face both internal and external risks in its operation and production activities. In this process, enterprises should combine their own operating characteristics, such as the business objectives, company size and business scope of the enterprise. In fact, risk assessment is to analyze and identify the potential risks that may be encountered in the process of achieving the strategic goals of enterprises, conduct differentiated assessment of risks of different degrees, and provide feasible basis for the establishment of internal control system. The process of risk assessment should also be in line with the comprehensive, including the whole business scope of the enterprise, to achieve the systematization of risk control, so that the enterprise in the risk control prevention and control to achieve timely and efficient (Tetteh & Kwarteng, 2022).

2.1.4.3 Control of activities

The control activities of the enterprise are implemented after the risk assessment. The management of the enterprise, as the main body of the implementation, identifies the risk according to the results of the risk assessment, so as to realize effective risk prevention and achieve the purpose of controllable risk. Control activities are the policies and procedures to ensure the implementation of the instructions issued by the management of the enterprise for risk control. It not only exists in the personnel of all levels of the enterprise, but also runs through every link of the decision-making of the whole enterprise. It mainly includes: the analysis of enterprise performance by senior personnel, the processing and control of internal information by the enterprise management department, the entity control of the enterprise, such as the comparison of performance indicators and the division of labor, etc. For financial insurance enterprises, the contents of control activities include sales management, operation management and basic security work management (Lauraf, 2003).

2.1.4.4 Information and communication

The information communication of an enterprise should include the internal information generated by the internal processing of the enterprise and the external information such as handling external events, activities and environment. Effective

internal information can help enterprises to control the implementation degree of internal control decisions in various departments, which is conducive to improving the operation and production efficiency of enterprises. For the external information obtained by various departments of the enterprise, information should be shared to improve the coordination and coordination among various departments (James & Donald, 2012).

For financial insurance enterprises, information communication can promote employees to understand their position in the enterprise, and promote them to fulfill their responsibilities. The communication and sharing of information can make enterprises form an organic whole from personnel to departments, which is conducive to the overall planning of the information management platform for financial insurance enterprises, and further implement the effective collection and prevention of the risks existing in the operation process of enterprises.

2.1.4.5 Internal supervision

The internal control system requires an internal supervision. The internal supervision of an enterprises is conducted by the appropriate personnel or departments, in the appropriate and timely circumstances, to evaluate the design and operation of the internal control. The internal supervision of an enterprise is a continuous process to ensure that the internal control of an enterprise could be continuously and effectively implemented (Ye, 2020).

2.2 Gray evaluation

The gray evaluation method is an evaluation method based on the gray system, which is also a mathematical theory method. Its main characteristic is that it can evaluate the multi-level complex system. The implementation process includes the establishment of the gray evaluation model, the determination of the weight of each evaluation index, and the comprehensive evaluation and evaluation. It can be combined with AHP hierarchical analysis, which helps to improve the accuracy of evaluation. This paper studies the internal control optimization of PICC, which is to construct the gray evaluation model based on the gray evaluation method, and combines the expert investigation method, AHP hierarchical analysis method and gray evaluation method for in-depth evaluation analysis.

2.3 Expert survey

Expert investigation method is the process of issuing anonymous culvert to experts in related fields, obtaining the feedback information of experts on the problems in the anonymous culvert, and sorting out, summarizing and counting the feedback information. The characteristics of this method are the anonymity, feedback and statistics in the process of implementation. Among them, anonymity is the most important characteristic of this method. There is no contact between the experts who accept the invitation, and they do not know who participated in the evaluation, which

eliminates the influence of the authority of individual experts, which makes the feedback results more objective. In the feedback of related problems can objectively feedback the real opinions and ideas, which is very conducive to the qualitative analysis of practical problems. The expert survey method adopted in this paper mainly adopts the form of questionnaire, which corrects the existing evaluation indicators through the feedback of experts to the evaluation indicators in the questionnaire.

2.4 Analytic hierarchy process

The analytic hierarchy process is a good combination of qualitative and quantitative methods. It mainly analyzes the complex multi-objective problem decision making, and this method is often used in combination with the expert investigation method. It mainly divides a complex problem into several small levels, and the weight of these small levels is set through the feedback of expert survey. Then, the judgment matrix is constructed by building the mathematical model, and then the feature vector is solved to obtain the priority weight of each element of each small level to an element of the previous level. The final weight of the total target is confirmed by using the established hierarchical hierarchy. Through the establishment of mathematical model for quantitative analysis, the overall analysis results have a certain authenticity and scientific.

2.5 Fuzzy comprehensive evaluation

The fuzzy comprehensive evaluation method is proposed by an American expert. Its main core is to use the fuzzy mathematics method and quantitatively transform the qualitative analysis according to its membership theory. It is a general evaluation method for a problem constrained by multiple factors. Its advantage lies in the strong system, can well solve the fuzzy, uncertain problems. This method is very suitable for the study of the internal control problem of financial protection enterprises.

2.6 Research Framework

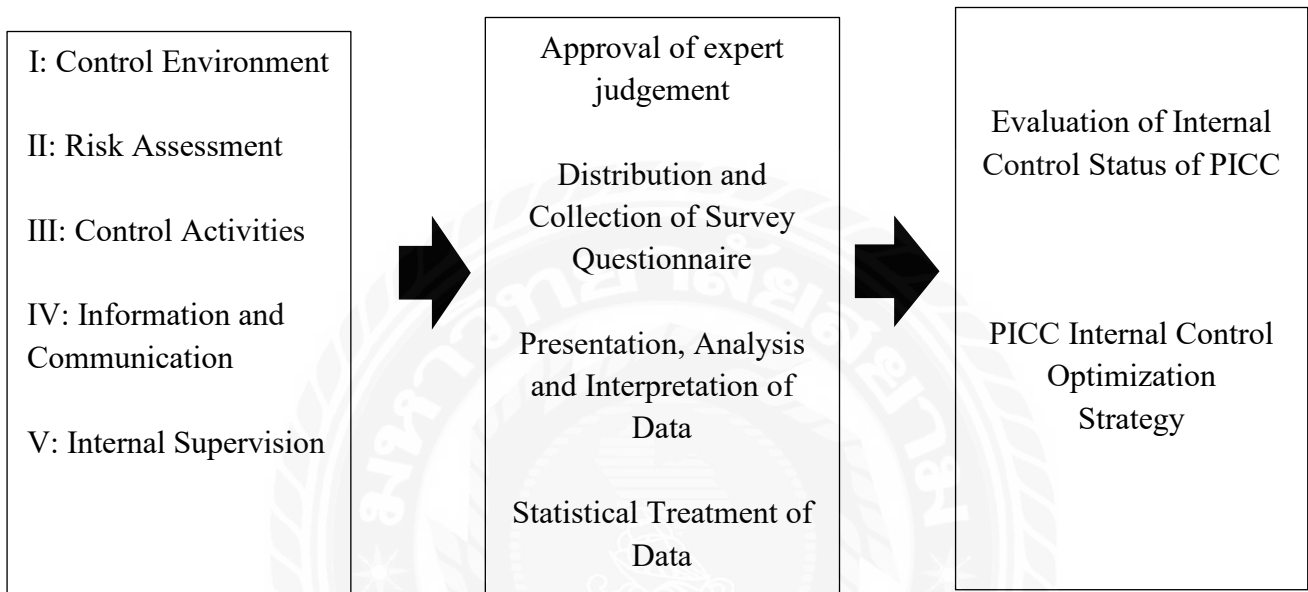| I: Control Environment	Approval of expert judgement	Evaluation of Internal Control Status of PICC
II: Risk Assessment	Distribution and Collection of Survey Questionnaire	
III: Control Activities	Presentation, Analysis and Interpretation of Data	PICC Internal Control Optimization Strategy
IV: Information and Communication	Statistical Treatment of Data	
V: Internal Supervision		

Figure 2.1 Research Framework

Chapter 3 Research Methodology

3.1 Research Design

This study used a combination of qualitative and quantitative analysis methods in the research process. The grey evaluation method was used to establish a grey evaluation model and a weight matrix of internal control evaluation indicators. Then, the feedback results from experts in the relevant fields were collected, to determine the first-level and second-level indicators, and to reconstruct the internal control evaluation indicators.

Before starting the development of the evaluation model, the five factors affecting the internal control of PICC Company were noted and analyzed, and hypotheses were made for each factor affecting internal control based on the information gathered from the literature and the internal control theory. After determining the hypotheses of the study, each hypothesis was verified through the grey evaluation model as well as the internal control system (COSO), and based on the results, it was concluded whether or not each internal control element was effectively applied in the company.

3.2 PICC Property Insurance Company Basic Overview

Before evaluating the internal control of PICC, it is necessary to analyze the five elements that affect internal control, which are control environmental, risk assessment, control activities, information and communication and internal supervision. The following section analyses the strengths and weaknesses within PICC based on each of these five elements.

3.2.2 PICC Property Insurance Company internal control status

3.2.2.1 Control environment status

PICC has done quite a good job in environmental control. The PICC branch has set up various departments according to the company's own situation, forming a comprehensive and clear internal organizational framework. The whole branch is guided by the decisions of the head office and is under the supervision and control of the head office in important business activities. In the organizational structure of the branch, the general manager is the highest leader of the company and the first person responsible for internal control management at the operational level. He is responsible for implementing the work requirements issued by the Head Office's Supervision Department, the Board of Directors and the Risk Management Committee of the Board of Directors, and organizing the implementation of the branch's internal control and risk management. Heads of departments are responsible for internal control and risk management in their own departments and assist the general manager in fulfilling his duties. The branch has

also set up a Risk Management Department as the lead department responsible for overall internal control management and risk management, and has set up a special office under the department to be responsible for the implementation of specific work. The branch audit department is under the responsibility of the Shenyang Audit Centre dispatched by the head office.

3.2.2.2 Risk assessment status

In terms of risk identification, PICC mainly starts from two aspects, risk appetite and risk management, and the selection of risk appetite is mainly based on the operation of branches and the actual situation of the current market to determine a stable risk appetite. The current risks of PICC mainly include strategic risk, operational risk, market risk and liquidity risk. In terms of risk management, the Company takes the overall business strategy objectives as its top priority. The company's risk management department shares information resources with all functional departments and business departments, and jointly builds an information0sharing platform. By collecting external risk information in the course of business development, it predicts and identifies whether there are risks in business processes and business activities, and ultimately realizes the internal control objectives of controllable risks and profit enhancement.

Currently, PICC has identified four areas of risk: strategic risk, market risk, operational risk and liquidity risk. Through the collection and analysis of internal and external risk information, the factors contributing to each risk are identified as follows:

The main factor of strategic risk in PICC is the risk of mismatch between the formulated branch strategy and the actual implementation effect and market environment. This is because branch strategies are formulated by the head office at the beginning of its establishment based on the local market situation, while the market environment is diversified and the strategic objectives do not change with the real-time market dynamics

3.2.2.3 Control activities status

Control activities are effective safeguards for the implementation of directives issued by management, either in the form of corresponding policies or in the form of implementation procedures. Generally speaking, the control activities of an enterprise include authorization, performance evaluation, information processing, physical control and segregation of duties. Control activities have different activities according to different implementation subjects. For property-casualty insurance enterprises, control activities are mainly reflected in three aspects: sales, business operations and financial reporting. Taking the above three aspects as an entry point, the internal control activities of PICC Property and Casualty Insurance Company are analyzed.

Sales control activities: PICC conducts sales activities in compliance with relevant national regulations and strictly observes laws and regulations. It has also formulated sales control programmers and work norms and construction measures for employees of the insurance sales team in line with the actual situation.

3.2.2.4 Information communication status

In order for insurance companies to take advantage of the fierce market competition among many of their peers, they need to have real-time control of information on changing market trends, new growth directions, and so on. However, simply collecting this information is not enough. Ensuring the timeliness of information is the key. The rapid transmission of information requires smooth communication channels, which is the key to the internal control of information control link. In internal control of information, enterprises divide information into internal and external information.

For internal information, PICC has developed a detailed process for collecting, processing and transmitting information. The mode, scope and type of transmission of internal information are clearly defined. An internal information system has also been set up to improve efficiency and the timely transmission of information.

External information: an information transfer network should be established between the various departments of an enterprise to effectively share information on market changes in the industry and competitors in the same industry. Enterprises collect and organize information based on this shared external information to achieve the role of risk warning. However, PICC only communicates relevant information in the form of documents, and does not open up a smooth information sharing channel for employees to integrate external information. In addition, the company is facing a complex market situation, the strength of the same industry, poor communication and untimely access to external information brings certain competitive risks to the company.

3.2.2.5 Internal supervision status

The internal control supervision of enterprises is mainly divided into two aspects. On the one hand, it is whether the daily work of the employees is carried out in accordance with the regulations and whether they comply with national laws and regulations in the course of the development of the enterprise. On the other hand, it is the work of investigating and assessing the current risk situation of the enterprise according to the established supervision department.

Currently, the supervisory organization of PICC is the Audit Department of the Company, which carries out supervisory reviews of the supervisees and is mainly responsible for supervising the implementation of the Company's internal control system and reviewing the Company's financial information and disclosure of information. For professional review.

3.3 Hypothesis

Based on the actual situation of the internal control problems of PICC, combined with the theory of internal control, the following five hypotheses are proposed before in-depth analysis. The specific problems and causes are as follows.

H1. The imperfect organizational structure has a negative impact on the internal control environment.

Looking at the current control environment at PICC, there are still deficiencies. Firstly, the role of the audit department has not been effectively played. As can be seen from the organizational structure of PICC, the work of the audit department of PICC is undertaken by the Shenyang Audit Centre sent by the headquarters. The work of the audit department needs to be coordinated with several departments. Since the audit department is independent of the company, this decentralized management model creates obstacles to the implementation of internal control in the subsidiary. This separated management also causes the audit department to neglect communication with the branch. Once problems arise in the internal business processes of the branch, it is impossible to get in touch with the audit department in time and can only solve the problems independently, which increases the probability of errors.

H2. The lack of comprehensive risk identification has adverse effects on the risk assessment of the enterprise.

The main problem encountered by PICC in the risk assessment process was that the risk assessment content was not comprehensive enough. The risk assessment indicators of PICC focused more on financial and business analyses, and lacked refinement of the analyses of policy indicators, which did not allow it to respond to existing risks in a timely manner.

H3. The non-standard sales process has adverse effects on the control activities of the enterprise.

Internal control activities are corresponding measures formulated and implemented by the company to ensure effective operation and management, and must be carried out in strict accordance with rules and regulations. The sales staff of PICC were negligent in managing the after-sales management of customers' policy information.

H4. The failure of external information has a serious impact on the internal control information communication.

Although PICC has established a detailed information collection, processing and transmission process in its internal information system. However, this internal information transfer channel can only deal with simple and single information, and lacks a complex and comprehensive information communication system to deal with complicated information. In terms of external information communication, there is a lack of an information sharing platform between departments, and external information obtained by each department, including the dynamics of the insurance market and information about competitors, cannot be communicated and exchanged in a timely manner.

H5. Audit department is the main factor affecting the internal supervision.

Due to the special characteristics of the organizational structure and internal audit department of PICC, its internal supervision mechanism is not perfect. PICC's internal control still relies mainly on the audit department sent by the head office. The company lacks its own internal control and supervision system, and the effectiveness of internal control and supervision is not comprehensive enough due to the lack of prevention beforehand and supervision during the incident.

3.4 Formulation of Evaluation Index System

3.4.1 Evaluation indicators

According to the COSO framework and the classification of the main influencing elements of internal control, the five elements of control environment, risk assessment, control activities, information communication and internal supervision are taken as the first-level evaluation indicators in the evaluation index system. Then, according to the actual situation of the enterprise and the current situation of internal control, 19 Level 2 indicators are set up, and the specific division is shown in Table 3.1~3.5.

Table 3.1 Evaluation indicators of control environment

Level 1 indicators	Level 2 indicators
PICC control environment A_1	Organization framework A_{11}
	Human resources A_{12}
	Enterprise strategy A_{13}
	Corporate culture A_{14}
	Social responsibility A_{15}

Table 3.2 Evaluation indicators of risk assessment

Level 1 indicators	Level 2 indicators
	Risk identification A_{21}

PICC risk assessment A_2	Risk analysis A_{22}
	Risk evaluation A_{23}
	Risk management A_{24}
	Supervision and improvement A_{25}

Table 3.3 Evaluation indicators of control activities

Level 1 indicators	Level 2 indicators
PICC control activities A_3	Sales business and management A_{31}
	Claims business and management A_{32}
	Financial business and management A_{33}

Table 3.4 Evaluation indicators of information communication

Level 1 indicators	Level 2 indicators
PICC information communication A_4	Rationality of the information system construction A_{41}
	Fluency of the internal information system A_{42}
	External information sharing transfer timeliness A_{43}

Table 3.5 Evaluation indicators of internal supervision

Level 1 indicators	Level 2 indicators
PICC internal supervision A_5	Internal audit effectiveness A_{51}
	Specialty of internal reviewers A_{52}
	Continuous monitoring A_{53}

According to the evaluation framework of COSO internal control in this paper, the five factors mainly affecting the internal control are set as the first-level evaluation index (A_1~A_5),which includes the control environment (A_1), risk assessment (A_2), Control activities (A_3), information communication (A_4) and supervision (A_5).According to the first-level indicators of these five elements, and combined with the current situation of PICC level 2   indicators   were divided and selected (A_{11}~A_{53}).Each level 2 gives the

corresponding consideration standard, and the invited experts can give certain points to each index according to the consideration criteria.

3.4.1.1 Control environment

In the first-level index control environment, five level 2 indicators are divided into organizational framework A_{11}, human resources A_{12}, Enterprise Strategy A_{13}, corporate culture A_{14} and social responsibility A_{15}. Among them, the consideration of organizational structure should consider whether the organizational structure of the enterprise is reasonable, the position and responsibilities of the matching of the concentration degree of three aspects of evaluation. In terms of human resources, whether the human resources policy is reasonable, whether it is reasonable to conduct regular training and performance assessment for employees. For the enterprise development strategy, emphasis should be given on whether environmental factors and development strategies are coordinated and whether development strategies can be adjusted and implemented in time. In the corporate culture, whether the construction and evaluation of the enterprise culture is reasonable. And in terms of social responsibility, whether enterprises regularly hold public welfare activities, and whether enterprises can actively respond to national policies.

3.4.1.2 Risk assessment

According to the current actual situation of PICC and the index requirements of COSO framework for risk assessment, five Level 2 indicators are divided into risk identification A under this first-level index risk identification A_{21}, risk analysis A_{22}, risk evaluation A_{23}, risk management A_{24} and supervision and improvement A_{25}. Where it should be used from Risk identification; for risk analysis, the professional analysis ability is the risk analysis team; the risk assessment should evaluate the risk assessment; the wind direction control, whether the enterprise has the ability to adjust the significant risk; finally, whether it has a sound risk protection system and the risk monitoring department.

3.4.1.3 Control activities

According to the actual situation of the control activities of PICC and the main business, they are divided into three Level 2 indicators to evaluate its internal control activities, namely sales business and management A_{31}, claim business and management A_{32}, financial business and management A_{33}. For sales business and management, the qualifications of sales personnel should meet the standards; in the claims business and management, the process of claims business should be convenient and reasonable; finally, for financial business and management, the professional level of financial accounting personnel.

3.4.1.4 Information communication

In terms of information communication, PICC divides the information into two categories: internal information and external information. Therefore, the first-level indicators are divided into three Level 2 indicators including: rationality of information system construction A_{41}, fluency of the internal information system A_{42}, external information sharing and transmission timeliness A_{43}.

For the consideration of internal and external information communication and information system construction, there should be three aspects: whether there are detailed internal information transmission process, timely information sharing among various departments, and whether the channels of information transmission and collection are smooth.

3.4.1.5 Internal supervision

Due to the particularity of the internal supervision system of PICC, this paper sets up three secondary evaluation indicators for the evaluation of internal supervision, including internal audit effectiveness A_{51}, specialty of internal reviewers A_{52}, Continuous monitoring A_{53}. Considering the effectiveness of internal audit, whether the internal audit is carried out regularly and the professional competence of the internal reviewers.

According to the above division of evaluation indicators, there are 5 first-level indicators and 19 level 2 indicators. The internal control of PICC is evaluated by the first and second level indicators. Table 3.6 is the consideration table of the evaluation indicators of PICC.

Table 3.6 Evaluation indicators of PICC

Target layer	Level 1 indicators	Level 2 indicators	Standard
China personal guarantee Property insurance of the public In the department Department control System Rice refers to Standard	Control environment (A_1)	Organization framework (A_{11})	The rationality of the organizational structure of the enterprise, the rationality of the post setting, and the concentration of responsibilities; Whether the human resources policy is reasonable, whether it can conduct regular training and performance assessment for employees Whether the environmental factors and the development strategy are coordinated, and whether they can be adjusted and implemented in time Whether the construction evaluation of enterprise culture is reasonable Whether enterprises regularly hold public welfare activities, and whether enterprises can actively respond to national policies
		Human resources (A_{12})	
		Enterprise strategy (A_{13})	
		Corporate culture (A_{14})	
		Social responsibility (A_{15})	
	Risk assessment (A_2)	Risk identification (A_{21})	Whether the identification process of risk is scientific Whether they have professional analytical ability Whether the focus of the risk assessment is reasonable Whether the enterprise has the ability to make strategic adjustments to the major risks Whether there is a sound risk protection system and a
		Risk analysis (A_{22})	
		Risk evaluation (A_{23})	

		Risk management (A24)	risk monitoring department
		Supervision and Improvement (A25)	
	Control activities (A3)	Sales business and management (31)	Whether the qualification ability of sales personnel meets the standards
		Claims business and Management (A32)	Whether the process of claims business is convenient and reasonable
		Financial business and Management (A33)	The professional level of the financial and accounting personnel
	Information communication (A4)	Rationality of the information system construction (A41)	Is there a detailed internal information transfer process as yet
		Fluency of the internal information system (A42)	Information can be shared in a timely manner
		External information sharing and transmission timeliness (A43)	Whether the collection channels are unblocked
	Internal supervision (A5)	Internal audit effectiveness (A51)	Whether to carry out the internal audit work regularly
		Specialty of internal reviewers (A52)	The qualification and ability of auditors
		Continuous monitoring (A53)	Whether it has an independent internal audit department

3.4.2 Basic information of the experts

This study was based on the establishment of gray evaluation model. One of the key steps in the establishment of gray evaluation model is to score the internal control of the enterprise, and construct the evaluation matrix with the evaluation structure of experts. This study invited 10 professionals in the field of internal control to score. According to the evaluation index system of PICC, the expert scoring table was designed. A total of 10 expert opinions including 10 valid opinions were recovered (see Appendix A for details).

3.4.2.1 Positive coefficient of experts

According to the Delphi study procedure, we know formula 3.1:

$$P = \frac{n}{N} \quad (3.1)$$

The expert scoring period of this paper is one week, and a total of 10 questionnaires were sent, and 10 professionals gave feedback, all of which were valid opinions. Therefore, the experts selected in this paper have a high degree of active cooperation.

3.4.2.2 Degree of expert authority

According to the implementation steps of Delphi law, in addition to the above positive coefficient of experts, the authority of experts should also be included in the scientific standard evaluation method, whose formula is 3.2:

$$q = \frac{(q_1 + q_2 + q_3)}{3} \quad (3.2)$$

Among, q1The academic level of the experts hired. The academic level is divided according to the title or qualification of the invited experts, and the criteria are shown in Table 3.7 below:

Table3.7 Quantitative table of academic level of the experts

Professional title or qualification	Professor	Corporate executives	Higher vocational education	Sub-high	Else
Level of scholarship	0.7	0.9	1.0	0.5	0.3

The second measure is that of the q2, refers to the source of knowledge of the experts invited in this study. Its measurement indicators mainly include: related theory research, practical experience, personnel in the same industry, subjective intuition four indicators. These four indicators directly affect the correctness of the experts on what they judge. The experts are evaluated in three grades: large, medium and small. The quantification table is shown in Table 3.8.

Table 3.8 Quantitative table for judging expert indicators

Judgment basis	The degree of influence of judgment based on expert judgment	
	Big	Small and medium-sized size
Theoretical	0.3	0.2
research	0.5	0.4
Hands-on	0.1	0.1
People in the same industry	0.1	0.1
Expert intuition		

The third measure is that of the q3, Refers to the familiarity of the hired expert in the relevant field. It is divided into five levels: very familiar, familiar, general, not very familiar, unfamiliar, and then assigns the value of (1.0,0.8,0.5,0.2,0.0). By formula: 3.2, the calculated expert authority evaluation results are shown in Table 3.9.

Table 3.9 Evaluation results of expert authority degree

	1	2	3	4	5	6	7	8	9	10	1

Expert academic level quantity q_1	0.99	0.5	0.5	0.77	0.5	0.0	1.5	0.7	0.9	0.
The judgment is based on the q_2	0.3			0.5						
Familiarity with the index, q_3	0.53	0.3	0.5	0.8	0.5	0.5	0.5	0.4	0.5	0.5
Combined results of q	0.63	0.5	0.2		0.8	0.8	1.0	0.8	0.8	0.8

According to the evaluation criteria, a q greater than or equal to 0.60 is acceptable. This paper calculates q =0.63, indicating that the authority of the offer expert is acceptable.

3.5 Gray Evaluation Model

This study established the gray evaluation method to evaluate the internal control status of PICC. The main core is to establish the gray evaluation model, can be roughly divided into seven steps. The specific steps are as follows:

Step 1: Build a set of evaluation indicators

The set of first-level evaluation indicators and second-level evaluation indicators are constructed as: $\{A_1, A_2, A_i\}$, $\{A_{i1}, A_{i2}, ..., A_{in}\}$。 Where, i=1,2,3,4,5, where A_{in} Level 1 index A_i the n th Level 2 indicators Dex in the.

Step 2: Determine the index weight

The hierarchical analysis method is adopted to determine the index weight to construct the judgment matrix. Table 3.10 and 3.11 are the connotation of the constructed matrix and the matrices, respectively.

Table 3.10 Matrix construction

	A_1	A_2	A_j
A_1	a_{11}	a_{12}	a_{1i}
A_2			
.....			
A_i	a_{i1}	a_{i2}	a_{ij}

Table 3.11 Connotation of the matrix elemental $_j$

a_{ij}	intension
1	And i and j are equally important

3	Is the i slightly more important than the j
5	Is the i is more important than the j
7	And i is more important than the j
9	And the i is absolutely more important than the j
2, 4, 6, 8	Between the above two adjacent judgment scales
count backwards	The importance ratio of i to j is λ, and then j is $1/\lambda$ to i

The relevant formula for the judgment matrix calculation is as follows:

The calculation formula (4.3) is as follows:

$$a_{ij} = \frac{1}{a_{ji}} (i \neq j) \quad (4.3)$$

Formula (4.4)

$$\lambda_{max} = \sum_{q=1}^{n} \frac{(AW)_i}{nW_i} \quad (4.4)$$

Matrix consistency test formula (4.5), the control table is shown in 4.12

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (4.5)$$

Table 3.12 Reference RI table for consistency test

Order	1	2	3	4	5	6	7	8	9
RI price	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

The relationships between CR, RI, and CI are shown in Equation 4.6.

$$CR = \frac{CI}{RI} \quad (4.6)$$

According to the consistency test rule, consistency test when CR <0.1, indicating that the judgment matrix is reasonably constructed.

The set of first-level index weights is B= (b_1, b_2, ..., b_i), among b_iIt represents the weight of the i th index in the first-level index. The summation formula is shown in 4.7.

$$\sum_{i=1}^{n} b_i = 1 \quad (4.7)$$

The set of secondary index weights is {b$_{i1}$,b$_{i2}$,...,b$_{ij}$}, Then the secondary index, b$_{ij}$The summation formula of is 4.8.

$$\sum_{i=1}^{n} b_{ij} = 1 \quad (4.8)$$

Step 3: Get the evaluation matrix

This step mainly constructs the evaluation matrix based on the scoring results of the invited experts. The scoring principle is given according to the four grades, among which 1 is poor, 2 is general, 3 is good and 4 is very good. The remaining 0.5,1.5,2.5,3.5 are between the three grades. The rank set is D= (4,3,2,1).

Ash class determination:

According to the grey evaluation method, there are 4 categories, expressed by n=1,2,3,4, respectively. From 1 to 4 corresponds to different grades: excellent, good, medium and poor. The calculation formula for the four types of ash classes is shown in 4.9~4.12.

n=1:

$$f_1(d_{ij}^r) = \begin{cases} 0, d_{ij}^r \notin [0,\infty] \\ \dfrac{d_{ij}^r}{4}, d_{ij}^r \in [0,4] \quad (4.9) \\ 1, d_{ij}^r \in [4,\infty] \end{cases}$$

n=2:

$$f_2(d_{ij}^r) = \begin{cases} 0, d_{ij}^r \notin [0,6] \\ \dfrac{d_{ij}^r}{3}, d_{ij}^r \in [0,3] \quad (4.10) \\ \dfrac{6-d_{ij}^r}{3}, d_{ij}^r \in [3,6] \end{cases}$$

n=3:

$$f_3(d_{ij}^r) = \begin{cases} 0, d_{ij}^r \notin [0,4] \\ \dfrac{d_{ij}^r}{2}, d_{ij}^r \in [0,2] \quad (4.11) \\ \dfrac{4-d_{ij}^r}{2}, d_{ij}^r \in [2,4] \end{cases}$$

n=4:

$$f_4(d_{ij}^r) = \begin{cases} 0, d_{ij}^r \notin [0,2] \\ 1, d_{ij}^r \in [0,1] \quad (4.12) \\ 2-d_{ij}^r, d_{ij}^r \in [1,2] \end{cases}$$

Step 5: Gray evaluation coefficient determination formula is shown in 4.13

$$x_{ij}^n = \sum_{i=1}^{r} f\left(d_{ij}^i\right) \quad (4.13)$$

Step 6: The weight vector and the full matrix are determined, whose formula is shown in 4.14.

$$y_{ij}^n = \frac{x_{ij}^n}{x_{ij}} \quad (4.14)$$

Step 7: the comprehensive evaluation of the value, the comprehensive evaluation of the first-level index value calculation Mk=Bk·Yk= (mk1,mk2,mk3,mk4) The formula is shown in 4.15.

$$M = \begin{Bmatrix} M_1 \\ M_2 \\ \vdots \\ M_k \end{Bmatrix} = \begin{Bmatrix} m_{11} & m_{12} & m_{13} & m_{14} \\ m_{21} & m_{22} & m_{23} & m_{24} \\ \vdots & \vdots & \vdots & \vdots \\ m_{k1} & m_{k2} & m_{k3} & m_{k4} \end{Bmatrix} (4.15)$$

The above is the completion of the seven steps to build a grey evaluation model. Through the above steps, the evaluation model of PICC was obtained, and the current situation of its internal control was obtained based on its score.

Chapter 4 Findings

This study adopted the grey evaluation method to evaluate the internal control status of PICC. The specific findings are as follows:

4.1 Evaluation Results of PICC Internal Control

According to the feedback of the invited experts on the internal control evaluation index, the judgment matrix construction of the level 1 and the level 2, the maximum feature vector calculation and the consistency test are conducted respectively. The judgment matrix construction table is shown in 4.1~4.6.

Table 4.1 Level1 index judgment matrix

	A_1	A_2	A_3	A_4	A_5
A_1	1	3	2	2	3
A_2	1/3	1/2	1/2	1	1/2
A_3	1/2	1	1/2	2	1
A_4	1/2	2	1	2	2
A_5	1/3	1	1/2	2	1

According to the formula, the weight B= (0.3531,0.0908,0.10604,0.2406,0.1551), then λ max=5.1126. With formulas 4.5 to 4.6 and compared with the reference table, CR=0.025 <0.1, which passed the consistency test.

Table 4.2 Control environmental judgement matrix of level 2 iindicators

	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}
A_{11}	1	3	1	2	3
A_{12}	1/3	1	1/2	1/3	2
A_{13}	1	2	1	1/2	2
A_{14}	1/2	3	2	1	3
A_{15}	1/3	1/2	1/2	1/3	1

According to the formula, the weight B_1= (0.2804,0.1168,0.1962,0.2663,0.1403).

Table 4.3 Risk assessment judgment matrix of level 2 indicators

	A_{21}	A_{22}	A_{23}	A_{24}	A_{25}
A_{21}	1	1/3	1	1/2	1/3
A_{22}	3	1	3	2	2
A_{23}	1	1/3	1	1/2	1
A_{24}	2	1/2	2	1	3
A_{25}	1	1/2	2	1/3	1

According to the formula, the weight B_2= (0.1011,0.3512,0.1223,0.2714,0.1540).

Table4.4 Control activities judgment matrix of level 2 indicators

	A_{31}	A_{32}	A_{33}
A_{31}	1	1/3	1/2
A_{32}	3	1	2
A_{33}	3	1/2	1

According to the formula, the weight B_3= (0.1484,0.4867,0.3649).

Table4.5 Information and communication judgment matrix of level 2 indicators

	A_{41}	A_{42}	A_{43}
A_{41}	1	3	2
A_{42}	1/3	1	2
A_{43}	1/3	1/2	1

According to the formula, the weight B_4= (0.5376,0.2983,0.1641).

Table 4.6 Internal Supervision judgment matrix of level 2 indicators

	A_{51}	A_{52}	A_{53}
A_{51}	1	1/3	1/3
A_{52}	1	2	2
A_{53}	3	1/3	2

According to the formula, the weight B_5= (0.1389,0.4168,0.4443). The evaluation index weight is determined by the level 1 weight set B and the level 2 weight index B_1~B_5. According to the internal control evaluation index rating table of PICC issued to the invited experts, the 10 valid scoring tables are issued and recovered, and the score matrix C of the secondary index is constructed. The specific contents are as follows. According to the above matrix C and gray class classification formula, and the secondary index A_{11} is calculated as an example, and the following results are as follows:

n=1,

$$A_{11} = \sum_{i=1}^{10} f_1\left(d_{11}^i\right) = 6.75$$

n=2,

$$A_{11}^2 = \sum_{i=1}^{10} f_2\left(d_{11}^i\right) = 8$$

n=3,

$$A_{11}^3 = \sum_{i=1}^{10} f_3\left(d_{11}^i\right) = 6$$

n=4,

$$A_{11}^4 = \sum_{i=1}^{10} f_4\left(d_{11}^i\right) = 0.5$$

The total number of gray categories evaluated is

$$A_{11} = A_{11}^1 + A_{11}^2 + A_{11}^3 + A_{11}^4 = 21.2500$$

According to the calculated total grey evaluation number of each Level 2 indicatorsndex and the weight of each Level 2 indicatorsndex, the evaluation weight vector and evaluation weight matrix are obtained from formulas. Table 7 is the set of evaluation value and evaluation right vectors.

$$C = \begin{pmatrix}
3 & 2 & 2.5 & 3.5 & 3 & 2 & 4 & 1.5 & 2.5 & 3 \\
2.5 & 2 & 1.5 & 3 & 1 & 2 & 1.5 & 3 & 2.5 & 2 \\
2.5 & 4 & 3 & 4 & 3 & 2 & 2.5 & 2 & 4 & 3 \\
4 & 3 & 2.5 & 2 & 2.5 & 3.5 & 4 & 2.5 & 3 & 2 \\
3.5 & 3 & 2.5 & 4 & 3 & 3.5 & 2.5 & 3 & 4 & 2.5 \\
4 & 4 & 3 & 3.5 & 3 & 4 & 3.5 & 3 & 3 & 2.5 \\
3.5 & 3 & 3 & 4 & 2.5 & 2 & 3 & 2.5 & 3.5 & 3 \\
2.5 & 1.5 & 2 & 2.5 & 3 & 2 & 2.5 & 2 & 1.5 & 2 \\
3.5 & 4 & 2.5 & 2 & 3 & 2 & 2.5 & 4 & 3.5 & 2.5 \\
2.5 & 3 & 1.5 & 2 & 2.5 & 2 & 2.5 & 2 & 2.5 & 3 \\
2.5 & 2 & 2.5 & 1.5 & 2 & 3 & 2.5 & 3 & 2.5 & 2 \\
3 & 4 & 2 & 3.5 & 3 & 3 & 3 & 3.5 & 2.5 & 3 \\
2 & 3 & 3 & 2.5 & 1.5 & 3 & 2 & 2 & 2.5 & 3 \\
3 & 3 & 2.5 & 3.5 & 3.5 & 2.5 & 3 & 3 & 2.5 & 3.5 \\
3.5 & 3 & 3 & 2.5 & 3 & 3.5 & 2 & 2.5 & 3.5 & 3 \\
2.5 & 2 & 3 & 2.5 & 3 & 2 & 3 & 3.5 & 3 & 2.5 \\
2 & 2 & 2.5 & 1.5 & 2.5 & 3 & 3 & 2.5 & 3 & 2 \\
4 & 3.5 & 3.5 & 4 & 4 & 3 & 3.5 & 4 & 3 & 3 \\
2.5 & 2 & 2 & 2.5 & 1.5 & 2.5 & 2 & 3 & 2.5 & 3
\end{pmatrix}$$

Table 4.7 Evaluation values and evaluation right vectors of A_{ij}

A_{ij}	Evaluation of estimate	Evaluation of weight vectors
A_{11}	21.2500	(0.3176,0.3764,0.2823,0.0237)
A_{12}	21.7500	(0.2413,0.3218,0.3448,0.0921)
A_{13}	20.5000	(0.3658,0.3904,0.2438,0)
A_{14}	20.7499	(0.3493,0.3855,0.2652,0)
A_{15}	20.6250	(0.3818,0.4121,0.2060,0)
A_{21}	18.7916	(0.4456,0.3814,0.1730,0)
A_{22}	21.1666	(0.3543,0.4094,0.2363,0)
A_{23}	21.7916	(0.2466,0.3288,0.3785,0.0461)
A_{24}	20.4583	(0.3604,0.3828,0.2568,0)
A_{25}	21.9583	(0.2675,0.3567,0.3529,0.0229)
A_{31}	21.9583	(0.2675,0.3567,0.3529,0.0229)
A_{32}	21.2083	(0.3595,0.4165,0.2240,0)

A$_{33}$	22.0416	(0.2778,0.3705,0.3289,0.0228)
A$_{41}$	22.0000	(0.3409,0.4090,0.2501,0)
A$_{42}$	20.4583	(0.3604,0.4317,0.2079,0)
A$_{43}$	21.9166	(0.3079,0.3954,0.2967,0)
A$_{51}$	22.000	(0.2727,0.3636,0.3409,0.0228)
A$_{52}$	18.5416	(0.4786,0.4404,0.0810,0)
A$_{53}$	21.9583	(0.2675,0.3567,0.3529,0.0229)

According to Table 4.7, combined with the weight matrix formula, to obtain the weight matrix Y$_k$:

$$Y_1 = \begin{pmatrix} 0.3176 & 0.3764 & 0.2823 & 0.0237 \\ 0.2413 & 0.3218 & 0.3448 & 0.0921 \\ 0.3658 & 0.3904 & 0.2438 & 0 \\ 0.3493 & 0.3855 & 0.2652 & 0 \\ 0.3818 & 0.4121 & 0.2060 & 0 \end{pmatrix}$$

$$Y_2 = \begin{pmatrix} 0.4456 & 0.3814 & 0.1730 & 0 \\ 0.3709 & 0.3345 & 0.2945 & 0 \\ 0.2466 & 0.3288 & 0.3785 & 0.0461 \\ 0.3604 & 0.3828 & 0.2568 & 0 \\ 0.2675 & 0.3567 & 0.3529 & 0.0229 \end{pmatrix}$$

$$Y_3 = \begin{pmatrix} 0.2675 & 0.3567 & 0.3529 & 0.0229 \\ 0.3595 & 0.4165 & 0.2240 & 0 \\ 0.2778 & 0.3705 & 0.3289 & 0.0228 \end{pmatrix}$$

$$Y_4 = \begin{pmatrix} 0.3409 & 0.4090 & 0.2501 & 0 \\ 0.3604 & 0.4317 & 0.2079 & 0 \\ 0.3079 & 0.3954 & 0.2967 & 0 \end{pmatrix}$$

$$Y_5 = \begin{pmatrix} 0.2727 & 0.3636 & 0.3409 & 0.0228 \\ 0.4786 & 0.4404 & 0.0810 & 0 \\ 0.2675 & 0.3567 & 0.3529 & 0.0229 \end{pmatrix}$$

Conduct the comprehensive evaluation value calculation, and calculate the first-level index of the evaluation system, and the results are as follows :

$$M_1 = B_1 \cdot Y_1 = (0.3356, 0.3802, 0.2668, 0.0174)$$
$$M_2 = B_2 \cdot Y_2 = (0.3386, 0.3814, 0.2708, 0.0092)$$
$$M_3 = B_3 \cdot Y_3 = (0.3160, 0.3908, 0.2814, 0.0117)$$
$$M_4 = B_4 \cdot Y_4 = (0.3413, 0.4135, 0.2452, 0)$$
$$M_5 = B_5 \cdot Y_5 = (0.3562, 0.3925, 0.2379, 0.0133)$$

The resulting evaluation matrix is shown as follows:

$$M = \begin{pmatrix} 0.3356 & 0.3802 & 0.2668 & 0.0174 \\ 0.3386 & 0.3814 & 0.2708 & 0.0092 \\ 0.3160 & 0.3908 & 0.2814 & 0.0117 \\ 0.3413 & 0.4135 & 0.2452, & 0 \\ 0.3562 & 0.3925 & 0.2379 & 0.0133 \end{pmatrix}$$

The comprehensive evaluation results of the calculated first-level index are: P= (0.3373,0.3919,0.2598,0.0109).

Based on the comprehensive evaluation value of the first-level index, the internal control evaluation value of the first-level evaluation index is as follows:

$$Z_1 = M_1 \bullet D^T = 3.09$$
$$Z_2 = M_2 \bullet D^T = 3.06$$
$$Z_3 = M_3 \bullet D^T = 3.04$$
$$Z_4 = M_4 \bullet D^T = 3.03$$
$$Z_5 = M_5 \bullet D^T = 3.04$$

The comprehensive evaluation value of PICC Property Insurance Insurance Company is as follows:

$$Z = P \bullet D^T = 3.05$$

4.2 Hypothesis Test Results

From the results of the comprehensive evaluation of 3.05, the condition of the internal control has just reached good grade standard. Through the comprehensive evaluation of the five elements of internal control, the scores are as follow:

(1) Control environment

PICC's scored 3.09 points for its internal control environment. First of all, from the score of its organizational structure in general, the internal framework of the enterprise is relatively reasonable. PICC has a good score in corporate strategic development and corporate culture, which has been recognized by most experts, which shows that it can closely follow the development goals of the head office in strategic deployment and effectively complete the strategic plan. At the same time, in terms of social responsibility, the enterprise can have a certain social responsibility, and has such a good public welfare reputation among the public, which has been recognized by the public. However, its shortcomings are reflected in the human resources, most of which the experts give poor scores, which is enough to show the serious nature of internal control talents and the lack of internal talents in the company. The management of an enterprise needs to formulate

the corresponding talent introduction and training system, and strengthen the execution of the human resources department.

From the environmental control score of the overall internal control, it can be seen that PICC internal control still has shortcomings, and its internal control system still needs to be improved. Therefore, Hypothesis 1 is verified, and the imperfect organizational structure has a negative impact on the internal control environment.

(2) Risk assessment

Through the scores of 10 experts, the comprehensive evaluation of PICC in risk assessment is worth 3.06 points, indicating that it is generally good in risk assessment. Especially in the risk identification and risk assessment, PICC can accurately control its own risk types, and can control the risk elements. In terms of risk control, the performance is mediocre. Most experts give them moderate scores, indicating that they need to be improved in the original risk control. The two poor aspects are reflected in the risk evaluation and supervision, which shows that the internal supervision agency of the company does not play its functions well, and there are deficiencies in the management.

According to the results, PICC performs well in risk assessment, especially in risk identification, which indicates that Hypothesis 2 is verified and lack of comprehensive risk identification has a negative impact on the risk assessment of enterprises.

(3) Control activities

The comprehensive evaluation score for control activities was 3.04 points, which was close to the overall comprehensive evaluation value. China insurer in control activities, its main refinement into three aspects, in sales, claims, financial business and management, including sales and financial are most experts to the poor score, that China insurer in the two aspects of control activity management loopholes, is the weak link in the overall enterprise operation. In terms of claims settlement, most experts gave a good score between 3 and 4 points, which is mainly attributed to the systematic process of claims settlement business of Chinese insurance and property insurance companies, as well as the strict control of the management of the company's claims department.

From the results, the score performance of PICC in control activities is general, mainly because of its relatively low score in sales, which also verifies the Hypothesis 3, meaning that the non-standard sales process will have a negative impact on the internal control activities of the enterprise.

(4) Information communication

The comprehensive evaluation score in this aspect was the lowest among the five elements, with a score of 3.03 points. The main defects are reflected in the rationality

and fluency of the information system construction. In these two subdivided elements, most experts scored poor scores, indicating that PICC has serious planning deficiencies in the construction of the internal information system, and the loopholes of the information system seriously affect the internal information transmission and sharing of the company, and even affect the overall normal efficiency of the execution of the company.

The above results fully prove the that the failure of external information would has a serious impact on the communication of internal control information, indicating that Hypothesis 4 is verified.

(5) Internal supervision

Similarly, the comprehensive evaluation score of PICC in the internal supervision was relatively low at 3.04 points. From the three elements of its refinement, the main problem in the effectiveness of internal audit and continuous monitoring, the scores of experts in both aspects are relatively low. The reason is caused by the particularity of the separation structure of the audit department of PICC. It should establish its own internal audit department, rather than through the external distribution structure of the head office, which greatly affects the sustainability and timeliness of the audit.

The above results cannot fully prove the establishment of Hypothesis 5, because it can only see the impact on the supervision link, could not impact on the entire internal contro

Chapter 5 Conclusion and Recommendation

5.1 Conclusion

In this study, PICC was evaluated in its internal control system. Combined with the expert investigation method and the AHP hierarchical analysis method, a set of internal control evaluation index system suitable for the insurance industry was established.

The internal control of PICC is comprehensively evaluated by using the fuzzy comprehensive evaluation method. The evaluation results indicate that the PICC internal control performance is general. From the internal control environment, risk assessment, internal control activities, information communication and internal supervision and other five aspects need to be strengthened.

In the optimization strategy, this study develops the relevant suggestions for the internal control optimization. This study recommends strengthening the internal control and supervision system and the information transmission mechanism, and strengthening the risk warning mechanism in internal control risk prevention and control. This will enable pre-event and process supervision, and ultimately form a closed-loop internal control and supervision system.

5.2 Recommendation for future study

The collection and collation of feedback and ratings from experts on the five elements of internal control concluded that PICC had the following problems with internal control:

（1）In terms of control environment, there are deficiencies in its internal organizational structure, the audit department is not able to function effectively, there is a lack of internal control personnel, and little attention is paid to their training.

（2）In terms of risk assessment, the risk assessment was not comprehensive enough and the policy analysis lacked refinement. The risk assessment is also one-sided, focusing only on the assessment of major high-probability events while neglecting the risk assessment of minor probability events, and the results lack objectivity.

（3）In control activities, the main problem in the claim's operation, for example, was that there was no actuarial calculation of the estimated compensation amounts. In addition, there is no division of authority for different compensation amounts. For large amounts of compensation, supervisors have to authorize the amount of compensation twice.

（4）In terms of information communication, there is no internal and external information sharing platform, and internal and external information sharing and transmission are poor, which not only results in valuable external information not being reported to management in a timely manner, but also reduces the efficiency of the implementation of management's internal control and other decisions. It affects the good operation of the whole company.

（5）Internal supervision and internal supervision of PICC have led to the lack of effectiveness of the internal supervision mechanism, making it difficult to carry out continuous supervision. In addition, internal auditors are highly specialized, and the implementation of relevant training should be strengthened.

After evaluating and analyzing the internal control of PICC, the overall comprehensive evaluation value is 3.05 points, which indicates that the internal control is well carried out and the internal control system is relatively perfect, but there are still some deficiencies. There are still some suggestions for improvement below, hoping to give it some reference value.

（1）PICC should continuously strengthen and improve the effectiveness of its internal control and supervision system. In addition, it should also strengthen the risk early warning and carry out risk supervision throughout the whole process of internal control, so that the implementation of internal control has certain risk guarantee.

（2）PICC should consider two aspects in establishing a good internal control system and improving the internal control system. On the one hand, it should improve the level of internal control implementers and hire relevant external experts and professional organizations to carry out evaluations. On the other hand, internal control evaluation should be carried out on a regular basis and a mechanism for responsible persons should be established. The evaluation results should directly hold the relevant responsible persons accountable, while shortcomings should be corrected by a deadline.

（3）The information transfer mechanism should be improved. In the information transfer mechanism of internal control, the key lies in the timeliness of information. This requires all departments to have the awareness that information serves internal control when dealing with internal and external information, and the information obtained by each department should be sent to the decision-making level of the enterprise at the first time after collection and collation. On the other hand, it is also necessary to strengthen information sharing and information processing efficiency between departments. The platform system for information sharing can be established to transfer, communicate and process information between departments, and regularly maintain the system to ensure the smoothness of information transfer in the information system. Finally, the security of the information system should be ensured to prevent the leakage of important corporate information.

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Appendix

Dear experts:

First of all, thank you all for your active participation! This questionnaire aims to determine the weight of the internal control evaluation system of PICC. Please, according to your understanding of PICC, score the evaluation indicators of internal control of PICC. This study selects five first-level indicators and 19 Level 2 indicators based on five elements of internal control. Now ask you for the first and second level indicators of the score. The score of this survey is divided according to the grade 1~4, which are poor, general, good and very good. In order to be able to score scientifically, the intermediate score is also adopted, the middle value of 0.5,1.5,2.5,3.5 respectively represent under the poor, between the poor and the general, between the general and good, between the good and very good.

Table A   Expert scoring table of internal control evaluation indicators of PICC

Target layer	Level 1 indicators	Level 2 indicators	Fraction			
			.5	.5	.5	.5
China personal guarantee Property insurance of the public In the department Department control System evaluation Price refers to	Internal control environment	Organizational Framework				
		Human resources				
		Enterprise Strategy				
		Corporate culture				
		Social responsibility				
	Internal control risk assessment	Risk dentification				
		Risk analysis				
		Risk valuation				
		Risk management				
		Supervision and improvement				
	Internal control activities	Sales business and management				
		Claims business and management				
		Financial business and management				
	Internal control for	The rationality of the information system construction				
		Fluency of the				

Standard body tie	information communication	internal information system	
		External information sharing and transmission timeliness	
	The Company's internal control and supervision	Internal audit effectiveness	
		Specialty of internal reviewers	
		Continuous monitoring	