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Master's Science in Engineering

**Performance Evaluation of the
Chinese Real Estate Developer's
Quality Management**

by

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The Graduate School

Seoul National University

August 2017

Performance Evaluation of the Chinese Real Estate Developer's Quality Management

by

Yanni Tang

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of the requirements for the degree of
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Performance Evaluation of the Chinese Real Estate Developer's Quality Management

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Performance Evaluation of the Chinese Real Estate Developer's Quality Management

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Abstract

Performance Evaluation of the Chinese Real Estate Developer's Quality Management

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In recent years, the real estate industry in a rapid development, but at the same time, a lot of capital investment still has not change back to quality improvement, the complaints about building quality in the real estate industry accounted for the first in China. Real estate project quality accident continue to occur. In fact, the real estate developers to strengthen quality management can significantly improve the project quality, but now the problem is lack of related practice and theory about quality management evaluation for real estate developers. In order to evaluate developer's current quality management level accurately, and find out the deficiencies for targeted improvement, this paper attempts to establish a reasonable and effective evaluation indicator system on developer's quality evaluation, so as to ultimately improve the quality management performance of developers.

The developer's responsibility of quality management in existing legal norms, and the research and best practice on developer's effective measures of quality management at home and abroad are the basis foundation of developer's quality management evaluation. This paper summarized the responsibility and effective measures of the quality management of the developers through a lot of literature research also and summarized the general process and main contents of the quality management of real estate developers, then summed up the main points of developer's quality management. This prepared a theoretical basis. for developer's quality management performance evaluation.

Based on the above content, developers' quality management can be divided into two main parts. The first part is developer's self-management in the early stage of project when the other project participants like designer and contractors has not involved in. After entering the design survey stage, with the participation of designer, contractor and supervisor, the main responsibility of developer became to participant's management. Therefore, this paper starts from the two aspects of the developer's own management and the participant's management established an indicator system, which contained 2 first-level indicators, 8 second-level indicators, 17 third-level indicators. Afterwards, this research used the questionnaire survey and Analytic Hierarchy Process (AHP) to assign the weight of the indicators.

Finally, the developer could understand own quality management through

the Quality Management Performance Evaluation Indictors System established in this research, and basis on the evaluation results could find out the shortcomings in management process and make corresponding improvement measures.

Keyword: Real estate developers, Quality management, Performance evaluation, Performance indicator system

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Chapter 1. Introduction

This chapter deals with the current quality management problems in the real estate industry and the needs for this research. To solve the problems, research objectives are established. Then, research process to attain the objectives effectively are addressed.

1.1. Research Background

With the deepening of the reform of the housing system after the reform and opening up in China, the process of urbanization has accelerated and China's GNP (Gross National Product) and residents' disposable income has increased. Also influenced by the concept of traditional Chinese housing ownership, the demand for commercial housing rose sharply, huge market demand makes Chinese real estate industry have a rapid development. The latest statistics of the National Bureau of Statistics show that the average annual growth rate of real estate development investment is 18.7% in the five years from 2010 to 2014(Figure 1-1). The number of Chinese real estate development enterprises in 2015 are 93.4 thousands, had increased by 4 times than 1998(Figure 1-2).



Figure 1-1 the Amount of Real Estate Development Investment form 2010~2014(National Bureau of Statistics of China)



Figure 1-2 the Number of Real Estate Development Enterprise from 1998~2015(National Bureau of Statistics of China)

However at the same time, a lot of investment could not change back the improvement of quality, quality accident continue to occur. In 2010, 6 affordable housings in Beijing were ordered to be demolished and rebuilt because of the concrete strength used by the main structure did not meet the design requirement. In 2011, a building in Zhejiang Province appeared uneven settlement, was overall demolished. In addition to that, consumer complaints about the quality become more and more. According to the Guangzhou Daily Ocean Online (2005), 25 percent of residential owners in China are dissatisfied with the quality of their homes after checking in. In 2014, the Consumers Association of Housing and Building Materials dealt with 24,599 complaints, the complaints of quality is in the first place. Building quality problem not only bring losses to consumers, for real estate developers also would lead to a lot of rework and project delay, and bring about loss of money and the reputation of corporate brands.

Although quality management is very important for real estate developers, in China, developers are often less involved in quality management, even many of their actions can bring adverse effects on quality management. According to a survey conducted by the Ministry of Construction in 2006, the results show that the total of 21224 illegal construction activities were found in the country, the non-standard behavior of developers are 18460, accounting for 86.98%. The results of this survey show that real estate developers quality management exist insufficiency. Therefore, it is necessary to do further

research for the real estate developers how to carry out systematic quality management.

In order to improve the quality management ability of real estate developer, it is necessary to grasp the current quality management ability of the developers, to identify the problems and shortcomings in the process of their quality management, and be able to bring forward a reasonable opinion for quality management. Therefore, it is a more appropriate method to establish the quality management performance evaluation system for real estate developers to evaluate and improve the quality management level, and to improve the quality management performance.

At present, the quality management evaluation in Chinese construction industry mainly aim at the construction enterprises, but quality management evaluation for developer is few. Some of the quality management evaluations that are carried out just mainly aim at some independent project construction sites, for these reasons, there need to establish the quality management performance evaluation system for real estate developers

This study attempts to establish a quality management evaluation system for real estate developers. This evaluation could reflects the real estate developer's actual level of quality, provide a basis for the developers to optimize the quality management activities, and promote the real estate development project's quality and quality management level, improve competitiveness for the development of enterprises. The evaluation results on

the one hand can be used for self-evaluation for enterprises to improve the quality management level; the other hand can be used for enterprise qualification evaluation or for the industry award criteria.

1.2. Research Objective and Scope

In this research, ultimate goal is establishing a quality management performance evaluation system for the developers that can have effective evaluation for developer's quality management level. In order to achieve this ultimate goal, first using the method of literature research to sort out and summarize the relevant research. Second, through the literature research and the method of summarize to find out the points of developer in the project quality management, as well as the relevant provisions of the Chinese law. Then, through the method of theoretical deduction based on the above research to establish a quality management performance evaluation system, Finally, AHP questionnaire used to collect the data from the relevant experts to calculate the weight value of the quality management performance evaluation system.

Through the analysis of the evaluation results can summarize the deficiency in quality management. The evaluation system also can help the developers to pay more attention to quality management.

This research focuses on the project development process of quality management, so the scope of research is from the project proposal stage to project acceptance stage (Figure 1-3).

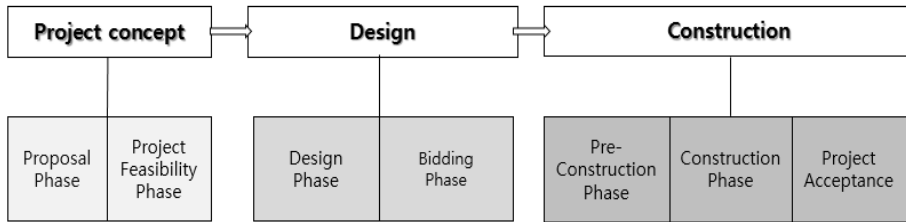


Figure 1-3. Research Scope

In China, real estate developers are generally referred to as Party A or owner, and in Western developed countries or regions are generally referred to as owners. China's real right law stipulates that: owners refer to the country, collective or private who has the right to possession, to use, to dispose the buildings in accordance with the law. In the project form the proposal stage to the completion stage, who invest is the owners. Obviously, developers in the project development process belongs to the domestic and foreign research in the "owners" category. The "developer" in this paper refers to the owner in the process of project development.

Research object of this study is real estate developer, quality management performance evaluation was conducted on the enterprise level, not the project level.

1.3. Research Procedure

The order of this research is as follows

1) Research on the studies of quality management of development project and the situation of developer's quality management at home and abroad.

2) Summarizes the existing research on the developer's responsibility of quality management in legal norms, and the research and best practice on developer's effective measures of quality management at home and abroad. Developer's quality management responsibility and quality management effective measures will be the basic basis for evaluation.

3) Based on the above analysis, choosing the applicable quality management evaluation indicator, establishing the evaluation indicator system for developer's quality management. Through the Analytic Hierarchy Process and questionnaire survey to determine the weight of indicators.

The research process can be illustrated as Figure 1.4.

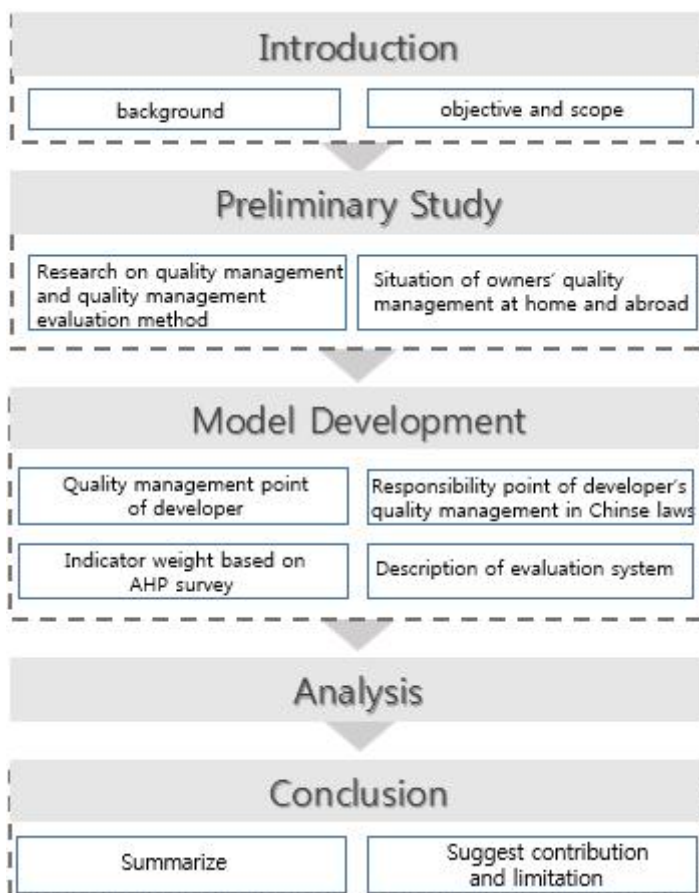


Figure 1-4. Research Process

Chapter 2. Preliminary Study

This chapter reviews previous researches of quality management of developers and the current situation of quality management of domestic and foreign developers, and the status quo of performance evaluation. This chapter summarizes the quality management characteristics of real estate development projects then, this chapter addresses why it is need to have a performance evaluation for developer's quality management.

2.1. Literature Review on Quality Management

To put it simply, the quality management of real estate project is a series of measures and methods adopted in order to ensure the quality of the project meets the project contract, design document and standard.

Cao (2013) and Cui (2016) thought that real estate project is different from general construction projects. The developers is the main body of real estate project. Real estate project is a cyclical process. In the process, the participants are not only real estate developers, but also other department and personnel, such as government department, planning department, urban construction department, environmental protection department, design department, construction units and so many other main section. Although they are independent of each other, they participate in the productive process of real estate projects. Therefore, the quality management of real estate project is not independent of a certain stage, it has characteristics of longer life cycle, many management links, many subjects involved, that it has to connect every part to manage contrapuntally and systematically.

Meng (2014) believed that every project decision from the feasibility research, to the quality of the final completion of each stage of acceptance in the process of finishing work will directly affect the final quality of real estate projects, quality management of real estate projects should contain the whole process.

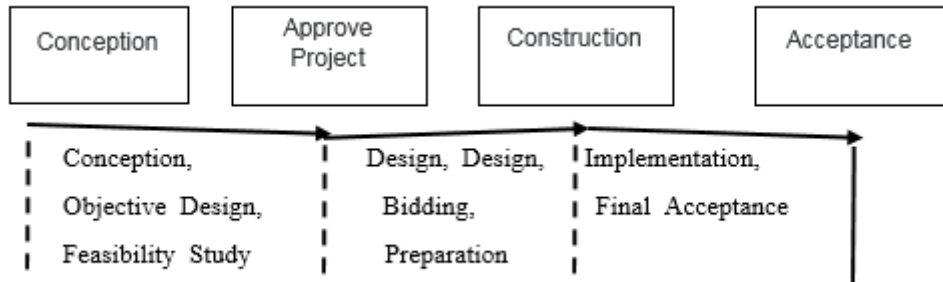


Fig.2-1 Process of real estate project quality management

Zheng (2015) put forward that the project quality management in addition to the owner quality management organization, quality management capability of outside other factors, also affected by other project participants, and analyzed quality management influencing factors of each of participants by the questionnaire.

However, nowadays in china, part of the real estate enterprises emphasize the pursuit of rapid construction. Because of lacking construction of professional knowledge, have over reliance on management level and quality assurance system of the construction units, supervision units and design units, when quality, investment and progress affect the quality of the project, it also brought many quality problems to the society.

2.2. The Importance of Quality Management of Developer

The developer is the main body of engineering construction project decision-making and the investor, is in the process of the president who raised the implementation of construction projects, to coordinate various resources construction projects, to organize construction project each participant according to the owner of the targets of construction activities. Owner is the sponsor and chief supervisor of the quality control power of the construction project, which is of great significance to the final realization of the quality standard of the construction project. Owners mainly determine the requirements of the project, provide financial support, organize the construction project management team, and implement effective management supervision at all stages and stages of construction projects. If the owners to implement their own responsibilities are not sufficient and suitable bound in the project implementation process of buried construction project participants in the conflicts and disputes, will eventually affect the quality of the project or project investment failure. Therefore, it is an important guarantee for the smooth progress of the project to make clear the responsibility and power of the owner's construction team

Han (2012) thought that traditional construction project management is mainly the management of the project construction. The project management

of the contractor is an important guarantee for the quality of the project. But it also exists obvious limitation such as too much attention to excessive, lack of real considerations of developer and builder.

Mu (2008) through the research of American company Paldi, Real Estate Company Paldi Company has for 50 consecutive years of profit, can guarantee that his customers have 50% repeat purchase, by quality. Thus we can see that improving the quality of products is an effective way to improve the competitiveness of the company.

On the other hand, Chen and Zhu's (2003) related research shows that the real estate business identity has duality, which plays the identity of the developers during the construction of the project, the integration of design, supervision and construction of the construction units of resources for project implementation quality of all units in the process of the work of inspection and acceptance design and construction services; as a buyer of design and construction service, because of information asymmetrically, the developer's knowledge of product quality information is inferior to that of the construction party, if not strengthen the quality management of construction, it will be very easy to be cheated by the construction. In the housing, the developers of commercial housing for the quality inspection and acceptance to the construction of product sellers identity, as the housing product providers, real estate development companies more need to improve the quality of housing in order to enhance their competitiveness in the market.

2.3. Current Situation of Owner' s Quality Management at Home and Abroad

From the point of development stage, developed countries have gone through a very long historical stage, their management model have been quite mature. While China started late, the development time is shorter.

From the point of way of the project management, developed countries generally use the General Contracting or PMC (Project Management Contractor) management approach to do project management, developers fully commissioned by the project management company. In China, the developer select the design, contractor and supervision by themselves. They are involved in the project management directly. Although most projects have supervision who selected by developer based on the relevant laws and regulations, the management of supervision is not carte blanche management model, supervision's work is largely subject to the developer.

From the point of existing research about developer's quality management, Robert K. Hughes and Samir A. Ahmed (1991) presented that the key to the project quality management is project participants and supervisor's quality. The performance evaluation of personnel from all levels is effective implementation of quality management, the developers use the evaluation results of quality management personnel can improve the project quality effectively.

Donne E. Hancger and Sean E. Lanber (1991) from the perspective of main quality management participants, bring participant's quality management behavior into the evaluation. They thought as the developer of the project not only should to strengthen their own quality management behavior, but also should take various measures to improve the contractor's quality of management actively.

In China, the research on the developer's quality management is basically from the perspective of the self-quality management of the developers, the other participants are rarely involved, the content of the research review of developer's quality management summarized as follows:

Table 2-1. Research review of the developer's quality management

Content	Results
Developer's Quality Management Function	Yan (2007) from the perspective of the developer, identified main functions in the project management, built a core competency model, and analyzed each core functions

Content	Results
Developer's Impact on Quality Management	Zhang (2005) from the point of view of the formation process of quality, studied the relationship between the participants of the project and analyzed the impact of quality formation process by the developers and put forward some suggestions on the quality management activities for developers. Shang (2008) described the necessity of improve project quality and the internal and external factors which have an impact on quality management from the perspective of the developer. Researched on an actual project to explore the solutions that can improve the level of quality management.
The establishment of the developer's quality management system	Li(2006) from current domestic situation of quality control and exiting problem, described how to establish a quality management system. Huang (2008)through the analysis of developer's role and, presented that developer should establish a quality management system, and make the quality management point of each stage clear. Building a core competency model, and analyzed each core functions.
Quality evaluation	Chen(2006) from the perspective of developer, designed a quality evaluation model based on total quality management, present that the process of implementing the quality assessment must be the whole process.

2.4. Quality Management Performance Evaluation

Quality management performance refers to the effectiveness and efficiency of the developer to implement quality management, which reflects the results of the quality management achieved by the developer. Performance evaluation on quality management is not only use the collected information and the calculated data to differentiate the quality management performance, but also through the analysis of the performance evaluation results to reflect and solve problems hidden behind the project quality management, and provide some suggestions for project quality management improvement and perfection.

The first step of the quality management performance evaluation is to determine the purpose of performance evaluation. Then is to obtain evaluation information including who implement the evaluation and evaluation object, and then according to requirement of evaluation object to determine the evaluation indicator and evaluation criteria and select the evaluation indicator's weight, finally draw the conclusion.

The practice of quality management performance evaluation in China still at the initial stage. Only with the National Quality Management Award re-established in 2001, domestic researchers grandly pay attention to quality management performance. Shanghai Julan Quality Research Institute is the

institution where started earlier to study high performance in China, they has researched on the quality performance self-evaluation model and method.

Lu (2014) presented that it is necessary to build a quality management evaluation system which can measure, diagnose, quality performance effectively and also can provide decision analysis. Because of the International Organization for Standardization (ISO) has promulgated the ISO9004 international standard to improve the quality management performance, but pay little attention on the standards and the process of performance improvement.

Jafari (1999) focused on the performance evaluation of the project process. Basis on the general project management model, he put forward the performance evaluation system based on the whole process management goal of the project.

Yu(2009), Zhou(2013) selected construction enterprise as an object, has built a performance management system suitable for the construction project.

Foreign researchers have been not limited to analysis on the evaluation results, but pay more attention to analysis and improve the quality management problem that reflected through the evaluation results. The domestic research still focuses on the evaluation and analysis of the project quality evaluation results. Therefore, in the establishment of project quality management performance evaluation model, should give full consideration to China's project quality and management system current situation, and as a

basis for the establishment of quality management performance evaluation system to improve the quality management.

2.5. Summary

This chapter analyzes the quality management characteristics of real estate development projects, the real estate project cycle is long, and each stage will directly affect the quality of the final project. Developers as to be able to participate in the management of each stage of the main body, there are negligence on quality management. After that, proved the necessity of the developer's quality management, compared the current situation of the quality management of the developer at home and abroad and summarizes the problems in the quality management of the Chinese developers. In order to find out the problems, the concept of quality management performance evaluation is introduced, and the existing research on quality management performance is analyzed.

Chapter 3. Deriving of Evaluation Indicator

In order to evaluate the quality management performance of real estate developers more pertinently, it is important to understand how the real estate development enterprises are managing the quality management. So in this chapter analyzed the basic content of quality management of real estate developers and summarized the existing research on the developer's responsibility of quality management in legal norms, and the research and best practice on developer's effective measures of quality management at home and abroad.

3.1. Process of Deriving of Indicator

Due to the complexity of developer's quality management, a simple indicators evaluation system can not reflect the performance level of quality management correctly. The and management works of developers covers all the important point of quality management, so this chapter will start from this point of view of quality management process and management works of developers, decomposed the management content summed up the main points of quality management, identify key factors and determine the evaluation indicators.

3.2. Deriving of Quality Management point of Developer

Developer's quality management is including the whole process from project conception to construction, and acceptance stage. The content of the quality management is different in each different stage so that the content of the quality management of developer will be introduced at various stages.

The first stage is proposal and feasibility phase.

This phase mainly consists of the drafting of the project proposal, the formulation of feasibility study report and the planning of housing product development. Specifically, first of all should conducting market research, collecting external information including government policies, requirements of local customer, development value and the local real estate scale surveys. As well as the company's internal information about own financial situation and management ability. Gathering and analyzing the data collected then get the preliminary proposal.

Because of the factors such as personal subjectivity will make the data and judgments different, there are usually several options for decision making. The development department analyzes the differences in the data from these various reports, and picks up the most realistic data and selects the optimal solution. Then it will further improve the proposal plan was selected, add cost estimation and other financial contents, then a reasonable feasibility plan. Completed.

The main control points of quality management at this phase as follows:

- ① To formulate a reasonable quality plan and responsibility system for quality management.
- ② Developers shall choose the enterprise that with the appropriate qualification to responsible for the feasibility study report.
- ③ Developers can use the way of tender to choose the consulting enterprise to responsible for the feasibility study report, according to the preliminary feasibility study plan and the project experience to make the choice. The qualification should be examined after the selection.
- ④ To clarify the quality standards and requirements of the project in feasibility study.
- ⑤ To build an approval system for the feasibility study report, establish audit team with professional personnel such as appraisers, construction engineers and market analysts.
- ⑥ It is necessary to verify the truthfulness of the contents and data in the proposal after the proposal formed.

The second stage is design and bidding phase:

This stage mainly includes the selection of designer and obtain the approval document for the environment and resource. Specifically, first the developers need to purchase the land and access to resources, environmental

protection and other aspects of the approval documents, and then according to the results of market research and project planning scheme, to begin design bidding, and organize the bidding evaluation team, select the optimal design scheme. According to the obtained land, combined with the results of market research analysis, select the corresponding construction scheme, commission the design unit to carry out detailed design. After procurement of equipment and materials, and the completion of the initial design and construction drawings, must ask the relevant government for approval.

The main control points of quality management at this phase as follows:

- ① Before the tender, it should be confirmed that 30% of the total investment is in place..
- ② Tender documents need to be clearly pointed out that the design requirements and standards, and the details of the project, the qualification requirements for bidders.
- ③ Design team members, and adhere to principles of advanced the technical program, reasonable pricing and reliable design. And also need to consider the performance of designer, professional technical strength and social credibility and other factors to evaluation.
- ④ The developer shall employ experts or consultants to review and supervise the design quality and design result at the design. In addition, there need to monitor if the input of their equipment,

professional personnel meet the requirements.

⑤ The contract to should include incentive to encourage designer to optimize the design as much as possible.

⑥ Before construction, shall organize a meeting for drawing review.

The project participants such as construction units, supervision units, materials and equipment suppliers should to participate.

The third stage is pre-construction and construction phase:

This phase mainly includes examining these equipment and materials, examining construction quality assurance measures, and supervising the construction party and supervision party to ensure the construction can be conducted smoothly.

Specifically, the developer needs to check and control the preparation work's quality of the contractors at the construction preparation stage. It includes qualification examination of construction party and the quality control of the construction teams and the workers.

To management the equipment and materials from the aspect of purchasing, manufacturing, transportation, loading and unloading, storage and using. To supervise and control the construction method, scheme and process, including the construction organization design or construction plan, construction quality assurance measures and construction plan.

To inspect and control contractor's preparation of environment and

conditions for construction.

In the process of construction, the developer should cooperate with the supervision to manage the contractor and supervise the activities of supervision.

The main control points of quality management at this phase as follows:

- ① To verify the qualifications of construction and supervision party, to check the construction workers and supervisions.
- ② To inspect the quality of engineering materials if compliance with the requirements of the contract and drawings.
- ③ To review the quality assurance measures, construction technical plan and construction organization design of the workers.
- ④ To check the construction quality from time to time, to participate in the inspection and acceptance of all the process.
- ⑤ To clear the responsibility and the specific content of the work of the supervision, to give the corresponding rights to the supervision and reduce interference.
- ⑥ In case of drawings or design changes, the project participants should be organized quickly to discuss.
- ⑦ To deal with quality problems or accidents, emergency measures must be set.

The last stage is acceptance phase:

This phase mainly includes thorough inspection of the project design quality and construction quality and equipment quality that conducted by the developers, construction unit, the designer, equipment and materials supplier, quality supervision departments, and obtain the vouchers of completion.

The main control points of quality management at this phase as follows:

- ① The corresponding emergency measures must be taken when the potential quality problem discovered during the acceptance process.
- ② Conduct information statistics, accumulate experience for follow-up work, and improve the work.

Through the above content analysis, the owner can be the main management contents of quality management is divided into several big part: abide by the laws and regulations, education training, supervision and inspection, emergency measures, the accident (quality management)

3.3. Deriving of Responsibility point of Developer's

Quality Management in Chinese Laws

The previous section analyzes and summarizes the main task and the main points of quality management of owners in each stage, in order to more fully grasp the construction unit of quality management practice and research, but also the need to sort out the relevant contents about the quality management requirements of the owners responsibility in the current law.

Developed countries attach great importance to the quality of the building. the first project management from the perspective of the owners appeared in the United States and the United Kingdom. In the past, the owners through the professional engineers on site to do project management, but with the project scale increased, on behalf of the owners of the construction project management appeared in the UK and the US in the 1970s. Gradually more and more attention to the owners of the quality management. -The owner's role was highlighted in the ASCE Manual of Professional Practice: Quality in the Constructed Project (1988). The manual describes the high impact that the owner has on the quality of a constructed project, which in many cases may determine the project's success or failure.(Tatufn, C. B.,1985) In UK, the government generally will require the owner to purchase quality control relevant insurance. In USA project quality supervision system, there is a need for developers to have construction quality management team to carry out the

supervision of the construction quality. In Germany, during the design process, the designer, the government and the developer must sign an agreement and execution each duties according to the agreement. Through the agreement, can make the responsibility breakdown, and the distribution of responsibilities become clearer. In France, there is a mandatory project insurance system for the owners. In other countries, owner must have a clear definition of construction product, if due to the wrong definition of user needs quality problems had arose, the loss caused will be the responsibility of the owner. (

In China, currently promulgated laws related to the quality responsibility of construction projects and units are "Construction Law", "Regulation on the Quality Management of Construction Project", in addition to "GB50326T-2016 Construction Project Management Standards" in the project quality planning, control and improvement are also applicable to the developers of quality management.

"Construction Law" is the first law to regulate construction activity in China, 8 chapters in total, the 6th chapter is about the construction quality management. In the 6th chapter stipulates that the quality management responsibility of the owner is only the application for construction permit, the required time to start, providing relevant information to the contractor, the selection of designer in decoration process. Specific content as follows (Table 3.1)

Table 3.1 Regulation of Owner's Quality Management in Construction Law

Article	Requirements
8	The construction unit to apply for construction permits should have the conditions
33,40,54	Notify the construction unit supervision of the content and authority. Provide information on the underground pipeline to the construction unit. The construction unit shall not submit to the design unit or construction unit illegal requirements.
49	The selection of design units in the decoration process
53	Implementation of quality system certification (non-mandatory)
65, 72	Legal responsibility
15,17,18, 20,21,22, 24,25	This is for the provisions of the contract unit, applicable to the owners in the bidding phase of the contract.

The first law enacted by China specifically for engineering quality management is “Regulation on the Quality Management Construction Project of promulgated” in 2000. 9 chapters in total, of which the standard owner’s behavior mentioned particularly prominent status, the owner’s behavior made a chapter 11 provisions. In addition, there are 9 other provisions related to the owner’s responsibility, the quality supervision of the project to regulate the quality behavior of developers as the focus, reflecting the comprehensive of the project supervision.

Table 3.2 Regulation of Owner's Quality Management in “Regulation on the Quality Management of Construction Project”

Article	Requirements
7	Owner shall contract out its project to an entity with the corresponding grade qualification. No construction project owner may contract out a construction project by dividing it into several parts.
8	Owner shall invite bids for the survey, design, construction, supervision of a construction project, and the purchase of important equipment and materials.
9	Owner shall provide the entities of survey, design, construction and construction supervision with the original, authentic, accurate and complete materials.
10	No construction project contracting-out entity may force the contractor to compete for a bid at a price below the cost or arbitrarily cut down the reasonable time period for the construction of the project. No owner may expressly instruct or give hint to the relevant entity to violate the mandatory standards on project construction, and lower the quality of the project.
11	Owner shall submit the construction drawing design documents to the construction administrative department or other relevant departments for examination and approval. Without examination and approval, no construction drawing design documents may be used.
12	The construction projects which shall be subject to supervision
13	Before a construction project owner fetches a construction license or report on construction start-up, it shall go through the formalities for the supervision over the project quality in accordance with the relevant provisions of the state.

14	If the construction materials, components, fittings and equipment are to be purchased by owner, it shall ensure that they conform to the design documents and contractual requirements. Owner may not expressly instruct or give hint to the construction entity to use any substandard construction materials, components, fittings and equipment.
15	The selection of design units for a decoration project involving the change of the main part and load-bearing structure of the building
16	The conditions should be satisfy before construction project for completion-based check and acceptance
17	Owner shall timely gather and arrange the documents and materials, establish sound archives for the construction project and timely transfer to the construction administrative department or other relevant departments.
49	Construction units in the completion of the completion of the acceptance of the record work.
54,55,56,57,58,59,74,77	Stipulates that the behavior of the construction unit in violation of the provisions of this Ordinance when the punishment

In addition to the laws adopted by the central government, the local government of China also made the construction engineering quality management related regulations or rules, further providing for the owners' quality management responsibilities. I am in this part of the study, search and obtain the 2 provinces of Anhui and Hunan, as well as Handan, Tianjin, Shenzhen, Hangzhou, Nanning and other 5 cities formulated for the construction of local quality regulations or local government regulations.

Through the analysis of the contents of these 7 local laws and regulations, the quality management responsibility for the requirements of developers is mainly reflected in the overall quality of responsibility, stakeholder management, project acceptance, the construction of information disclosure, the cost of the project, project bidding and other aspects. According to the above classification, these Regulations are summarized, which have been removed and repeated construction regulations or the content of quality management, leaving only the owners of quality management responsibilities more explicit, more stringent related content.

Table 3.3 Local Law and Regulation of Owner's Quality Management

	Requirements	Basis
Overall quality responsibility	Construction units are responsible for the quality of construction projects, should be equipped with quality management personnel responsible for construction quality management work, should be clear quality standards and quality responsibility.	“Regulations of Handan Municipality on Quality Control of Construction Projects” Article 6
	Implement quality behavior credit file system of responsible parties of	“Regulations of Handan

Relevant measures to ensure quality responsibility	engineering construction. Establish the main responsibility for construction, responsible for the quality, behavior, credit files, and publish regularly, and as the main responsibility for construction projects, responsible persons, qualification inspection, qualifications, promotion and so on.	Municipality on Quality Control of Construction Projects” Article 16
	The construction unit shall establish the responsible party of the five Party of the construction project, the person in charge of the project and the lifelong responsibility information file for the construction quality.	“Measures for the Administration of Quality and Safety Production of Construction Projects in Nanning” Article 30
	The responsible party of the five party in the construction project shall sign the lifelong commitment undertaking for the quality of the construction project.	“Measures for the Administration of Quality and Safety Production of Construction Projects in Nanning” Article 29
	The construction after the completion of the project acceptance, the construction unit shall, in appropriate	“Provisions of Tianjin Municipality on Quality

Construction information publicity	parts of Engineering mosaic signs, indicate the project name and construction, survey, design, construction, supervision unit name and the date of commencement of works, completion date and completion record number etc.	Control of Construction Projects” Article 11
		“Measures for the Quality Control of Construction Projects in Anhui” Article 15
	The establishment of construction, investigation, design, construction, supervision, testing, building materials production and supply units and related practitioners misconduct records publicity system. The competent administrative departments concerned shall record the acts in violation of the relevant laws, regulations and regulations and publish them through public media.	“Regulations of Shenzhen Municipality on Quality Control of Construction Projects” Article 10
Engineering	Before signing an engineering contract with an engineering contractor, the construction unit shall provide the engineering contractor	“Regulations of Shenzhen Municipality on Quality Control of Construction Projects”

cost guarantee	with the payment guarantee for the payment of the works issued by the financial, insurance or guarantee institution. The construction license shall not be issued unless the project payment guarantee is provided.	Article 20
	Construction units must guarantee the construction funds, and in accordance with the relevant provisions of the state and provincial engineering funds to provide payment guarantees. The construction project of government investment, the construction unit shall not carry out the engineering construction in capital construction units, contracting way.	“Regulations of Hunan Province on the Administration of Quality and Safety of Construction Projects” Article 9
Project bidding	Before contracting out of construction projects, the construction unit should be fixed according to the feasibility study report of the construction project and construction period, a comprehensive assessment of the scale of construction engineering, construction technology, geological and climatic conditions and other factors, determine the reasonable exploration period, design period and construction period, and the schedule as the substantive conditions of the bidding documents.	“Measures for the Administration of Quality and Safety Production of Construction Projects in Nanning” Article 20

	The construction unit shall, in accordance with the law, award the construction projects to the units with corresponding qualifications, and make clear the quality of the construction projects in the form of written contracts.	“Regulations of Hunan Province on the Administration of Quality and Safety of Construction Projects” Article 7
Emergency system	The construction units shall establish construction project identification and evaluation of major hazard, emergency response and early warning mechanism, strengthen the monitoring and management of major hazard source construction project.	“Measures for the Administration of Quality and Safety Production of Construction Projects in Nanning” Article 15

3.4. Effective Measures of Developer's Quality Management

Most of the research on project quality management in foreign countries are based on the developer's self- management of project quality and the contractor's management

Many scholars study that, in the feasibility study stage and design stage the ways which to strengthen the quality examination of engineering technology and select the appropriate quality standards are important ways to ensure the quality of construction projects and achieve the investment income. In the bidding phase, the developers could determine project contract price that makes the highest overall benefit according to the risk sharing rate of the incentive factors such as quality, cost and delivery time. In the construction phase, the full authorization and strengthening of the supervision of supervision, establish an effective incentive evaluation system for these participants can effectively improve the quality of the project.

In Hong Kong, in the case of government projects, the Government as the owner, generally only invites contractors these in the list of Public Works Recognized Contractors can to participate in the tender. Developed a scientific and rational evaluation methods to evaluation these contractors and the material suppliers. The developers participant on-site inspection and acceptance regularly. In the case of private projects, must need authorized

persons, such as a registered architect, a registered structural engineer and a registered surveyor.

Zeng(2001) presented that establishment and implementation of the quality culture is the driving force to achieve the purpose of project quality, establish a continuous improvement atmosphere.

3.5. Summary

In this chapter, described the process of the developer's quality management and the content of quality management of each stage. Divided the main content of the developer's quality management into two parts, one is developer's self-management, the other one is project participants management by developers. Summarized the requirements of the quality management responsibility of the developer in domestic and foreign legal regulations. Through the introduction of research and practice at home and abroad, summarized the important factors which influencing developer's quality management performance and the effective measures to improve quality management performance. This part is the standard of quality management performance evaluation.

Chapter 4. Performance Evaluation Indicator Model

This chapter aspiring to establish the performance indicator system of the quality management based on the previous chapter, which is about the basic content of developer's quality management, and the relevant law. The main objective of this evaluation indicator system is to use the system to evaluate the quality management level of the developers.

4.1. Process of Evaluation Model Development

The establishment of the evaluation indicator system is based on the specific goal and evaluation problem, to select the indicator and tease out the relationship of indicator. The intent of this study was to establish a evaluation system to find out the management shortages of developers and to improve the quality performance.

The developers' quality management can be divided into self-management and the participant's management. It is necessary to analyze the main points of the two parties separately, and refining the main elements. By perusing literature, I found that many scholars adopted three targets evaluation system when have evaluation on management performance of the construction enterprises and project in order to reflect the multi-level and multi-Dimension. In light of this, this research also attempts to divide the developers' quality management performance evaluation system into three levels.

4.2. Evaluation Model Development

In this study, the quality management performance evaluation system divided the level 1 index into the self-management of developers and the management of real estate project participants. Because if the quality management of the developer wants to achieve an effective goal, it must take a holistic approach management to make all the quality management activities of the participating parties more standardized and institutionalized. This division can cover the entire process of quality management of developers. At feasibility study stage, other participants have not yet participated in the project, the developer's self-management is particularly important. But at the project design and construction phase, acceptance phase, designer, the supervisor, the contractor are involved, the developers main work change into the management of real estate project participants. In general, for the quality management evaluation of the developer focus on whether their self-management is perfect and the management of real estate project participants is strict.

The level 1 just decided to divide into 2 parts: self-management and the management of real estate project participants, so it should seize the main factors affecting quality management from each aspects. In order to evaluate the internal quality management of the developer can proceed from the

internal quality management system from the view of enterprise level. Which ISO9000 standard requirements of the quality management system requirements, so the quality of the internal management of the enterprise part can learn from the concept and content of ISO9000, based on the quality management content and the point, focusing on the developer's quality management system.

ISO9000, although derived from the manufacturing industry, but in recent years is also widely used in the real estate and construction industry. ISO9000 is the same as the other management systems, using the 'PDCA' process control method, that is, planning, do, check, action 4 steps, firstly proposed by the American statistician Dr. Deming (W. E. Deming). In the operation of the "PDCA" mode, the main steps of the ISO9000 are as follows: 1) to clear the needs and expectations of customers and other stakeholders; 2) to establish the organization's quality policy and quality objectives; 3) to clear the objectives and responsibilities while achieve to the goal; 4) identify the necessary resources to achieve the quality objectives; 5) specify the methodologies for measuring the effectiveness and efficiency of each process; 6) apply these measurements to determine the effectiveness and efficiency of each process; 7) eliminate the causes of the occurrence of measures; 8) the establishment and application of continuous improvement of the quality of the system.

At this stage according to the above process and requirements of ISO9000,

combined with the characteristics of the developer, this article in accordance with the following process to analyze the developer self-management system. First, to establish the quality objectives of enterprises in accordance with the customer and market conditions, this is the first step. In the planning stage, developers should develop quality plans, and then according to the objectives and plans to establish a quality management organizational structure and clear the quality of the staff responsibilities. In order to ensure the smooth operation of the project implementation phase, developers should have the relevant quality management emergency rescue and other guarantees. In order to effectively monitor and correct itself, the developer should also have the inspection measures such as quality performance appraisal and corrective measures. The content of ISO9000 operating process requirements and the quality of management of the developer shown in Table 4.1.

Table 4-1. The self-management system of the developer and the
corresponding content of ISO9000 requirements

PDCA	ISO9000 related requirements	The corresponding content of developers self-management
Plan	Identify quality objectives and plans based on customer and other stakeholders' needs and expectations, as well as relevant laws and regulations	Quality management objectives, planning
Do	Resources, quality responsibility and awareness, quality personnel and organization construction, training	Related personnel quality education and training, project protection, Quality management organization structure, quality management responsibilities, personnel Contingency plan preparation
Check	Quality behavior supervision and inspection, evaluation, Precaution, internal review	Quality behavior supervision, performance appraisal
Action	Sum up and deal with	Sum up and deal with

It is necessary to evaluate the self-management of developer from these aspects as shown: quality management objectives, planning, related personnel quality education and training, project protection, quality management organization structure, quality management responsibilities, personnel contingency plan preparation, quality behavior supervision, performance appraisal. Base on this, these indicators of self-management of developer has derived as shown Table 4-2.

When evaluating the management on participants, it can be divided into

the choice of the participants, supervision of the participants, communication with the participants and the information of the participants. The choice of the participants is actually the process of bidding. Supervision of the participants refers to the behavior of the developer to supervise participants in the project progress. Communication with the participants refers to the behavior of coordinating the participant's communication. The information of the participants refers to the behavior of dealing with the related documents in the project progress. According to this, these indicators of management on participants of developer has derived as shown Table 4-2.

Table 4-2. Quality management performance evaluation indicator

Level 1	Level 2	Level 3
Self-management	Quality management objective and plan	Quality management objective
		Quality management plan
	Quality management organization and personnel	Quality management organization
		Quality management personnel
	Quality management measures	Employee training
		Supervision and inspection
		Quality performance assessment
		Funds
	Emergency plan	Emergency Preparedness Document
Management on	Tender management	Invitation for tender
		Bidding evaluation

Participants		
	Supervision and inspection	Qualification
		Materials and equipment
		Work process
	Coordination management	Communication of participants
	Information management	Information disclosure
		Data retention and management

4.3. Indicator Weight Based on AHP Survey

The evaluation of real estate enterprises quality management performance involves many indicators, so it needs determining the weight of each indicators in the comprehensive evaluation of multiple indicators. At the moment, the method of determining weights is mainly divided into subjective evaluation method and objective evaluation method. The former determine the weight coefficient of each index by subjective weight method mainly using the Delphi method, analytic hierarchy process (AHP) and Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS), etc. Because it can easily lead to deviations in the evaluation results, it is subjective and lacks uniform standards. The latter through objective weighting method to determine the weight coefficient of each index, mainly using the Principal Component Analysis (PCA), factor analysis, entropy weight method, etc. It

has strong mathematical theory and is more objective in the selection of weights. However, it depends on the actual problem domain, so its generality and policymakers participatory is poorer, counting methods are complex, and the decision-makers can not reflect different mathematical importance, advantages determine the weights and runs counter to the practical importance of the attribute. Because this quality management performance evaluation indicator system includes quantitative indexes and many multi-level multi-angle qualitative indexes, and the importance of each indicator is to quantify completely, which is supplemented by man's subjective judgment will play an important role. Therefore, this article adopts the subjective weight method. And the hierarchical empowerment method the most common used method in practice. It can stratify complex problems and quantify the qualitative problem, so this article choose the AHP method of the subjective weight method to determine the real estate developers quality management performance evaluation index weight and improve the effectiveness of the results.

The data for this study obtained by questionnaire based AHP. Questionnaire is a way to collect research data from research subjects in written form, with rigorous design of mental measurement items or questions. In this study, the purpose of this questionnaire is to analyze the quantitative relationship between the indicators in each evaluation level and the indicators

in the same level based on the quality management performance evaluation indicator system of the developers. The description of the questionnaire as follows:

According to the quality management performance evaluation indicator system of developers, the questionnaire was drawn from 2 first-level indicators, 8 second-level indicators, 17 third-level indicators respectively. The questionnaire divided into three parts (Appendix A):

Part I: The main content of the questionnaire and the information of the questionnaire issuer.

Part II: Background information including the age, gender, job, working age, job department and the name of the real estate company.

Part 3: Questionnaire of the two types of questions. One is importance ordination of the indicators at the same level. By indicators sorting it can generally determine the indicators at the same level which has the greater impact on the developer. Another type of problem is pairwise comparison of the indicators at the same level, for scoring, the value of point represents the degree of the importance, the point is between 1 and 5.

Research samples from the Chinese real estate development enterprises, in order to protect the personal information, there will not publish the related information. According to the results of the collected questionnaire, 28 answers are received.

① Result of AHP Survey Level 1

Among the 28 answer sheets, 28 answer sheets have the value under 0.1 of Consistency Index for level 1 question. The arithmetic mean values of them as shown in Figure 4-1.



Figure 4-1. Result of AHP Survey Level 1

② Result of AHP Survey Level 2

Among the 28 answer sheets, 25 answer sheets have the value under 0.1 of Consistency Index for level 2 question of self-management. The arithmetic mean values of them as shown in Figure 4-2.



Figure 4-2. Result of AHP Survey Level 2 (Self-management)

Among the 28 answer sheets, 24 answer sheets have the value under 0.1 of Consistency Index for level 2 question of management on participants. The arithmetic mean values of them as shown in Figure 4-3.

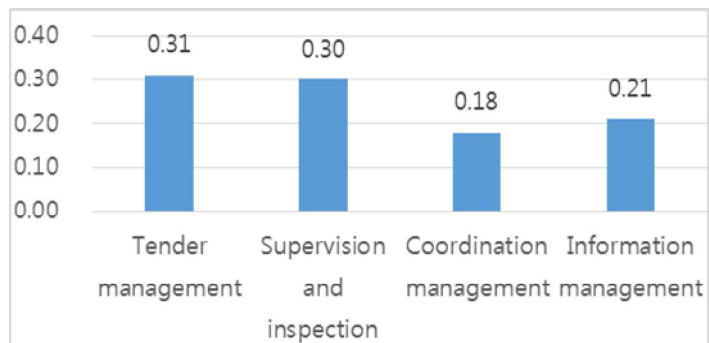


Figure 4-3. Result of AHP Survey Level 2 (Management on Participants)

③ Result of AHP Survey Level 3

Among the 28 answer sheets, 26 answer sheets have the value under 0.1 of Consistency Index for level 3 question of quality management objective and plan. The arithmetic mean values of them as shown in Figure 4-4.

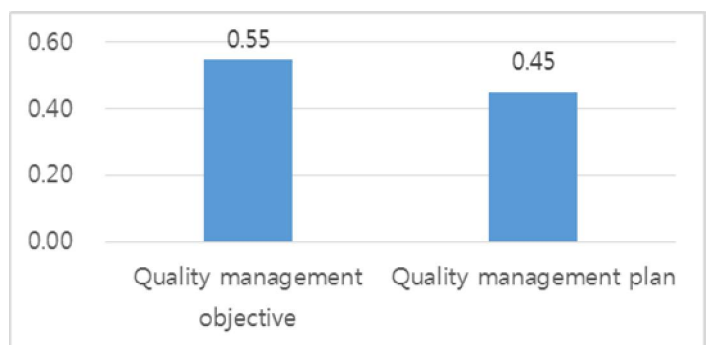


Figure 4-4. Result of AHP Survey Level 3
(Quality Management Objective and Plan)

Among the 28 answer sheets, 26 answer sheets have the value under 0.1 of Consistency Index for level 3 question of quality management organization and personnel. The arithmetic mean values of them are shown in Figure 4-5.



Figure 4-5. Result of AHP Survey Level 3
(Quality Management Organization and Personnel)

Among the 28 answer sheets, 21 answer sheets have the value under 0.1 of Consistency Index for level 3 question of quality management measures. The arithmetic mean values of them as shown in Figure 4-6.



Figure 4-6. Result of AHP Survey Level 3 (Quality Management Measures)

Among the 28 answer sheets, 26 answer sheets have the value under 0.1 of Consistency Index for level 3 question of tender management. The arithmetic mean values of them as shown in Figure 4-7.

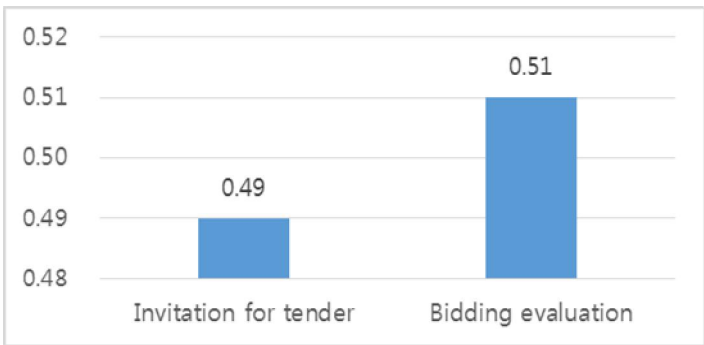


Figure 4-7. Result of AHP Survey Level 3 (Tender Management)

Among the 28 answer sheets, 26 answer sheets have the value under 0.1 of Consistency Index for level 3 question of supervision and inspection. The arithmetic mean values of them as shown in Figure 4-8.

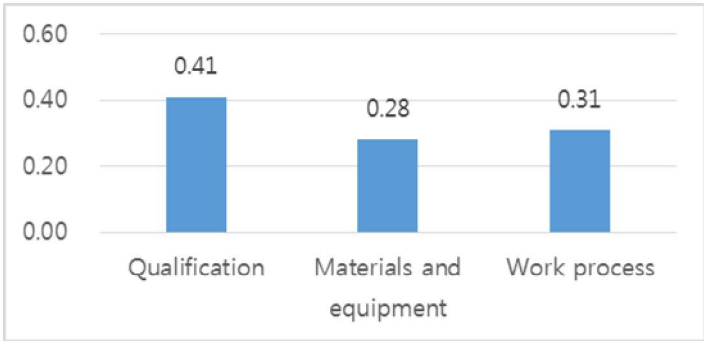


Figure 4-8. Result of AHP Survey Level 3 (Supervision and Inspection)

Among the 28 answer sheets, 26 answer sheets have the value under 0.1 of Consistency Index for level 3 question of information management. The arithmetic mean values of them as shown in Figure 4-9.



Figure 4-9. Result of AHP Survey Level 3 (Information Management)

After a combination of the weight of each level indicators, the final as shown in Table 4-2. And the whole model as shown in Table 4-3.

Level 1	Weights	Level 2	Weights	Level 3	Weights
Self-management	0.61	Quality management objective and plan	0.2	Quality management objective	0.11
				Quality management plan	0.09
		Quality management organization and personnel	0.14	Quality management organization	0.09
				Quality management personnel	0.05
		Quality management measures	0.18	Employee training	0.05
				Supervision and inspection	0.06
				Quality performance assessment	0.03
				Funds	0.04
		Emergency plan	0.09	Emergency Document	0.09
Management on Participants	0.39	Tender management	0.12	Invitation for tender	0.06
				Bidding evaluation	0.06
		Supervision and inspection	0.12	Qualification	0.05
				Materials and equipment	0.03
				Work process	0.04
		Coordination management	0.07	Communication of participants	0.07
		Information management	0.08	Information disclosure	0.05
				Data retention and management	0.03

Table 4-3. Quality management performance evaluation indicator weight

Level 1	Level 2	Level 3	Details	Evaluation					Weights	Score (=Evaluation a*Weights)
				A	B	C	D	E		
Self- management	Quality management objective and plan	Quality management objective	Rationality: Does it consider the actual capacity of enterprises and the market situation? Specification: Does it divide into short-term goals and medium- and long-term goals, as much as possible to quantify the objectives						0.11	
		Quality management plan	Specification: Does it define specific implementation points, responsibility department, time, capital plan?						0.09	
	Quality management organization and personnel	Quality management organization	Does it have quality management organizations? Are the responsibilities of each departments clear?						0.09	
		Quality management personnel	Does it equip with qualified quality management personnel? Are the responsibilities of each person clear?						0.05	
	Quality management measures	Employee training	Does it carry out employee training activities for improving quality behaviors?						0.05	
		Supervision and inspection	Does it regularly or irregularly supervise the quality behaviors of the organization and the personnel at the company level?						0.06	
		Quality performance assessment	Does it evaluate the completion status of quality management plan regularly? Does it evaluate the performance of employee regularly? Does it evaluate the company's quality management rules and the situation comply with laws regularly?						0.03	
		Funds	Does it make payment timely?						0.04	
	Emergency plan	Emergency Document	Does it prepare emergency plan documents, establish the emergency organizations to adopt emergency measures to deal with sudden quality accidents?						0.09	
Management on Participants	Tender management	Invitation for tender	Does bidding document clearly state the standards and requirements of design/construction/supervision on participants? Contain the details of the project and the qualification requirements on bidders?						0.06	
		Bidding evaluation	The professionalism of the evaluation team. Does it consider the technical strength, social credibility, company's performance, reasonable price when bidding evaluation?						0.06	
	Supervision and inspection	Qualification	Does it verify the qualifications of participants and managerial personnel?						0.05	
		Materials and equipment	Does it inspect the quality of engineering materials and equipment compliance with the requirements of the contract and drawings?						0.03	
		Work process	Does it check the construction quality from time to time, to participate in the inspection and acceptance of the process?						0.04	
	Coordination management	Communication of participants	Does it organize for the contractor, supervision, materials and equipment supply and designer to jointly examine the drawings and deliver the design before construction? Does it establish information communication network for participants?						0.07	
	Information management	Information disclosure	Does it publicize the the name of the project participants and other relevant information about project? Does it publicize the participant's bad behaviors and record, record and publicize the illegal acts timely?						0.05	
		Data retention and management	Does it establish project quality lifelong responsibility information archives of participants?						0.03	

Table 4-4. Quality management performance evaluation checklist for developer

4.4. Description of Evaluation Model

After obtained the weight of the evaluation index, the system completed and the specific operation process as follows.

During the performance evaluation, first setting up an organization or a team responsible for the quality management performance evaluation. The team composed of experts will undertake the quality management evaluation work. Secondly, these experts according to the evaluation checklist of Table 4-3 to give each evaluation aspect a score within 0 to 100 point based on their experience and knowledge. Here, 100 points divide into five levels shown as Table 4-5.

Grade	Score	Describes
A	80~100	Fully meet the requirements
B	60~80	Basically meet the requirements
C	40~60	Partially meet the requirements
D	20~40	Few part meet the requirements
E	0~20	Did not carry out the corresponding work or only a small part of the task

Table 4-5. Scoring Regulations

Evaluation implementer: According to the purpose of evaluation, the subject of implementation of the evaluation is also different. 1) If enterprises in order to improve their own quality management level, the evaluation can be

implement by the developer company's related personnel and the external experts or a third party to carry out. 2) If using the evaluation results as the industry award criteria, the evaluation can be carried out by the government or the relevant industry organizations.

Evaluation method: the evaluation will through the integrated approach of reviewing reports, personnel interviews, access to documents and records and on-site verification. Through the personnel interviews can understand the situation how is the company's quality management system going, and also can understand the quality awareness of workers of various department, and the level of involvement of quality management specific works, also can ask to provide supportive documents and records. Through access the document can check the implement situation of quality management measures, the records of quality management practices and the situation of data retention. Through on-site verification can understand the real situation of quality management on site about materials and equipment and construction process.

4.5. Summary

In this chapter, developed the quality management evaluation model of the developer based on the third chapter, and used the questionnaire based AHP to determine the weight of each index through the analysis of the survey results. And the operation method of evaluation model is described in detail.

Chapter 5. Conclusion

This chapter reviewed the main work of this research, and discussed the contribution and the limitations of this research. Finally, the future research work is presented.

5.1. Result and Discussion

With the rapid development of China's economic, the real estate industry also has a rapid development. However, a lot of investment could not change back the improvement of quality, quality accident occur frequently. Developers as a supplier of buildings, quality problem of building not only lead to a lot of rework and project delay, and bring about loss of money to real estate developers also would influence the reputation of developer's corporate brands.

Although quality management is very important for real estate developers, according to exiting research, the developers do not attach importance to quality management even real estate developers quality management exist insufficiency. Therefore, it is necessary to do further research for the real estate developers how to carry out systematic quality management.

In order to improve the quality management ability of real estate developer, it is necessary to grasp the current quality management ability of the developers, to identify the problems and shortcomings in the process of their

quality management. Therefore, it is appropriate method to establish the quality management performance evaluation system for real estate developers to evaluate and improve the quality management level, and to improve the quality management performance.

In this research, through in-depth study of quality management work, put forward a performance evaluation indicator system of quality management for developer, hoping to scientifically explore the factors that affect the performance of developer's quality management in quality management in order to provide targeted solutions.

5.2. Contribution

Through the analysis of the content of real estate project quality management and quality control process, summarized the characteristics of real estate project quality management. As well as analyzed the current situation of domestic and foreign developer's quality management. Researched on quality management performance evaluation. Expounded that the developers existing defects in the quality management of the real estate projects, and described the importance of the owners in the project quality management through the literature research.

Decomposed the content of developer's quality management at various stages, and summed up the management points of various phases. Through the analysis, divided the main content of the developer's quality management into two parts, one is developer's self-management, the other one is project participants management by developers. Summarized the requirements of the quality management responsibility of the developer in domestic and foreign legal regulations. Through the introduction of research and practice at home and abroad, summarized the important factors which influencing developer's quality management performance and the effective measures to improve quality management performance. This part is the standard of quality management performance evaluation. This part of the study could help developers to grasp the quality management risk of development project and

more systematic and comprehensive quality management.

Finally, through a large number of literature study and the above contents have studied, the evaluation indicator of the developer's quality management has selected, the quality management performance evaluation system for the developer is established. The weight of the indicator is determined by the questionnaire survey based on the analytic hierarchy process.

The Quality Management Performance Evaluation for Developers has established. It could use to have a effective evaluation of the level of developer's quality management, to understand the specific situation and result, find that the problems may be existing in quality management.

5.3. Further Study

The limitations of this research can be roughly divided into three.

The first point is that due to limited data and information, this research did not carry on the empirical research, it is lack of support of the implementation of the quality management performance evaluation and it also can not explain the validity of the quality management performance evaluation indicator system established in this research.

The second limitation is that selection of indicators may not be perfect and comprehensive cause the quality management is complex, has a lot of affecting factors of quality, and it involves all stage of development project.

The last limitation is that this study only deals with the physical quality of the project and does not involve the quality of property management after completion and acceptance phase.

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Appendix A

A. The Contents of Questionnaire

开发商质量管理绩效评价指标权重 调研问卷

您好，

本调查问卷是关于开发商质量管理绩效评价的研究的调查问卷。
您的回答将会给开发商质量管理绩效评价体系的建立的研究
给予很大的帮助，希望您能慎重地作答。
调查结果只会用于研究的相关内容，不会向外泄露您的个人信息。

- *问卷回答完毕后，请发送到以下邮箱，谢谢。
- *如果对问卷存在任何疑问，可以联系以下负责人。

✉ 地址：韩国首尔特别市冠岳区冠岳路1首尔大学39栋425号建设
技术研究室 唐燕妮

I. 个人信息

1. 年龄 ()
2. 性别 ()
3. 职务 ()
4. 工龄 ()
5. 就职的房地产公司名称 ()
6. 工作部门 ()

II. 研究内容介绍

研究内容： 本研究是关于开发商质量管理绩效评价的研究，在对开发商进行评价的时候，不同指标对开发商的质量管理的影响程度是不同的，这里需要您去判断这些指标的重要程度。

以下进行的问卷是为了导出评价指标的权重，希望回答者充分思考后再作答。

III. 企业内部管理与建设项目参与相关方管理的重要性比较

在考虑开发商进行项目的质量管理的时候，请您根据您的经验和知识，判断出以下哪一个指标对开发商质量管理的影响更大。请在您觉得影响最大的指标后面写1，其次为2，以此类推..... 如果您觉得这两个指标一样重要，请写下相同的数字。

一级指标	序号
开发商企业内部管理	
相关方管理 (对设计方、施工方、监理方等管理)	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

<第一阶段>

请比较每行左右的两个指标，选择出您觉得更重要的指标，用 ○ 或 √ 标示出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 < > 重要									基准
企业内部管理	5	4	3	2	1	2	3	4	5	相关方管理

重要程度	定义	内容
1	一样	两个指标一样重要
2	一点重要	其中一个指标比另一个重要一点
3	重要	其中一个指标比另一个重要
4	比较重要	其中一个指标比另一个比较重要
5	非常重要	其中一个指标比另一个非常重要

<第二阶段>

下面的指标是第一阶段比较的项目中 企业内部管理 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

二级指标	序号
质量管理目标和计划	
质量管理组织及人员	
质量管理措施	
应急预案	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，用 ○ 或 √ 标出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 < > 重要									基准
质量管理目标和计划	5	4	3	2	1	2	3	4	5	质量管理组织及人员
质量管理目标和计划	5	4	3	2	1	2	3	4	5	质量管理措施
质量管理目标和计划	5	4	3	2	1	2	3	4	5	应急预案
质量管理组织及人员	5	4	3	2	1	2	3	4	5	质量管理措施
质量管理组织及人员	5	4	3	2	1	2	3	4	5	应急预案
质量管理措施	5	4	3	2	1	2	3	4	5	应急预案

下面的指标是第一阶段比较的项目中 相关方管理 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

二级指标	序号
招标管理	
监督检查	
协调管理	
信息管理	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，用 ○ 或 √ 标示出比另一个指标更加重要多少的程度。
数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 ‹ › 重要									基准
招标管理	5	4	3	2	1	2	3	4	5	监督检查
招标管理	5	4	3	2	1	2	3	4	5	协调管理
招标管理	5	4	3	2	1	2	3	4	5	信息管理
监督检查	5	4	3	2	1	2	3	4	5	协调管理
监督检查	5	4	3	2	1	2	3	4	5	信息管理
协调管理	5	4	3	2	1	2	3	4	5	信息管理

<第三阶段>

下面的指标是第二阶段比较的项目中 质量管理目标和计划 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

三级指标	序号
质量管理目标	
质量管理计划	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，用○ 或 √ 标示出比另一个指标更加重要多少的程度。
数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 < > 重要									基准
质量管理目标	5	4	3	2	1	2	3	4	5	质量管理计划

下面的指标是第二阶段比较的项目中 质量管理组织及人员 的下一级指标。
请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

三级指标	序号
质量管理组织	
质量管理人员	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作

答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，用 ○ 或 √ 标示出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小， **两边一样重要的时候请选择1， 数字越大表示越重要。**

基准	重要 < > 重要										基准
质量管理组织	5	4	3	2	1	2	3	4	5		质量管理 人员

下面的指标是第二阶段比较的项目中 **质量管理措施** 的下一级指标。

请重复以上的步骤， 请在您觉得影响最大的指标后面写1， 其次为2， 以此类推…… 如果您觉得这两个指标一样重要， 请写下相同的数字。

三级指标	序号
员工培训 （对企业员工进行质量管理相关的教育， 可培养员工的质量认识，也可提高员工操作的 的正确性）	
质量监督检查 （开发商开展定期及不定期的公司内部 的巡检，或检查重要部门和领导人的行为操作）	
质量绩效考核 （对重要员工或部门的管理绩效进行考评）	
资金保障 （保障工程款支付的资金）	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，○ 或 √ 标示出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小， **两边一样重要的时候请选择1， 数字越大表示越重要。**

基准	重要 < > 重要									基准
员工培训	5	4	3	2	1	2	3	4	5	质量监督 检查
员工培训	5	4	3	2	1	2	3	4	5	质量绩效 考核
员工培训	5	4	3	2	1	2	3	4	5	资金保障
质量监督 检查	5	4	3	2	1	2	3	4	5	质量绩效 考核
质量监督 检查	5	4	3	2	1	2	3	4	5	资金保障
质量绩效 考核	5	4	3	2	1	2	3	4	5	资金保障

下面的指标是第二阶段比较的项目中 招标管理 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

三级指标	序号
招标	
评标	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，○ 或 √ 标示出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 < > 重要	基准
----	-----------	----

招标	5	4	3	2	1	2	3	4	5	评标
----	---	---	---	---	---	---	---	---	---	----

下面的指标是第二阶段比较的项目中 监督管理 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推..... 如果您觉得这两个指标一样重要，请写下相同的数字。

三级指标	序号
相关企业资质和人员技术资格	
材料和设备	
工作流程	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，用 ○ 或 √ 标示出比另一个指标更加重要多少的程度。
数字的大小代表了重要程度的大小， **两边一样重要的时候请选择1， 数字越大表示越重要。**

基准	重要 < > 重要									基准
相关企业资质和人员技术资格	5	4	3	2	1	2	3	4	5	材料和设备

相关企业资质和人员技术资格	5	4	3	2	1	2	3	4	5	工作流程
材料和设备	5	4	3	2	1	2	3	4	5	工作流程

下面的指标是第二阶段比较的项目中 信息管理 的下一级指标。

请重复以上的步骤，请在您觉得影响最大的指标后面写1，其次为2，以此类推……如果您觉得这两个指标一样重要，请写下相同的数字。

三级指标	序号
信息公开	
资料保存与管理	

以下内容是比较各指标间的重要程度。请根据您上面填写的重要顺序作答。

请比较每行左右的两个指标，选择出您觉得更重要的指标，○ 或 √ 标示出比另一个指标更加重要多少的程度。

数字的大小代表了重要程度的大小，**两边一样重要的时候请选择1，数字越大表示越重要。**

基准	重要 < > 重要									基准
信息公开	5	4	3	2	1	2	3	4	5	资料保存与管理

Abstract in Korean (국문 초록)

중국개발자 대상 품질관리 평가모델 개발

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최근 중국 부동산 산업은 급속한 발전을 이루어지는 동시 많은 투자를 투입 했지만 건물품질 여전히 개선하지 않았으며 품질불량으로 인한 품질사고가 속출한다. 중국에서 부동산에 관한 건물 품질에 대한 불만이 1위를 차지했다. 사실, 부동산 개발사는 품질 관리 강화를 하면 프로젝트 품질을 크게 향상시킬 수 있지만 현재 중국에서 부동산 개발자의 품질관리에 관한 실천과 이론이 부족한 실정이다. 따라서 본 연구는 개발사의 품질 관리 수준을 정확하게 평가할 수 있으며 관리상의 부족을 찾아 내기 위하여 개발자의 품질 관

리 성과를 궁극적으로 개선하기 위하여 개발자의 품질 평가에 대해 합리적이고 효과적인 평가 지표 모델을 구축하려고 한다.

기존의 법적 규범에서 개발사의 품질 관리에 대한 책임과 국내외 개발사 품질 관리에 대한 효과적인 조치에 관한 연구 및 사례는 개발사의 품질 관리 능력 평가진행의 토대이다. 본 논문은 많은 선행 연구를 통하여 개발사 품질 관리의 책임과 효과적인 조치를 요약하고 개발사 품질 관리의 일반 프로세스 및 주요 내용을 요약 한 다음에 개발사의 품질 관리 요점을 제시했다. 이것은 개발사의 품질 관리 성과 평가를 위해 이론적 근거를 마련했다.

위 내용을 토대로 개발사의 품질 관리는 크게 두 부분으로 나눌 수 있다. 하나는 프로젝트 설계 단계 전에 설계자 및 시공사 등 다른 프로젝트 참여자가 참여하지 않는 프로젝트 초기 단계에서 개발사의 자체 관리이다. 설계단계에 진입 한 후 설계자, 시공사 및 감리의 참여로 개발사의 주요 책임이 다른 참가자를 관리와 감독이 되었다. 따라서 본 연구는 개발사 자신의 관리와 참여자의 관리 두 가지 측면에서 시작되며 2 개의 1 차 지표, 8 개의 2 차 지표, 17 개 3 차 지표가 포함된 부동산 개발사 프로젝트 품질관리 평가 모델을 구축했으며 설문 조사와 AHP (Analytic Hierarchy Process) 를 사용하여 지표의 가중치를 지정했다.

본 연구에서 구축된 개발사 품질관리 평가 지표 모델을 통해 개발사 자신의 품질 관리 수준을 파악할 수 있으며, 평가 결과를 바탕으로 관리 프로세스의 부족을 찾아 낼 수 있고 그에 대해 상응한 개선 방안을 도출 할 수 있다.

주요어: 부동산 개발사, 품질관리, 성과평가, 평가모델

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