THE QUALITY MANAGEMENT OF CHINESE REAL ESTATE LANDSCAPE PROJECT

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FACULTY OF BUILT ENVIRONMENT

UNIVERSITY OF MALAYA

KUALA LUMPUR

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RESEARCH PROJECT SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT

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THE QUALITY MANAGEMENT OF CHINESE REAL ESTATE LANDSCAPE PROJECT

ABSTRACT

With globalization and urbanization, people's demand for the urban environment and living environment is more diversified. The requirements for the quality of landscape design are becoming higher and higher. Nowadays, all over the world are building a variety of garden projects and are constantly building. Many developers build projects because they have a business philosophy of following the crowd. However, most of these garden projects were of low quality, especially real estate. In order to repay the investment fund, many developers choose the high-speed development mode, and they will not consider the quality management of landscape engineering. Under the environment of high-speed requirements and a considerable workload, practitioners can only ensure that the quality of landscape projects meets the most basic requirements. However, with the development of society, human needs have become diversified, which not only needs to meet the basic needs of human practicality and economy but also needs to consider the needs of spirit and aesthetics. It also represents the standard of landscape quality because customers' needs are improving. At present, real estate landscape practitioners encounter many complaints about quality problems because they cannot meet customers' needs. In addition, the landscape quality also affects the decision-making of house buyers, that is, the house sales of developers. Therefore, developers and users pay more attention to the quality management of today's real estate landscape.

However, there is often a contradiction between the work requirements of real estate landscape practitioners and customers' needs. Customers' needs are improving, but the practitioners' knowledge of project management, especially quality management, has

not increased accordingly. This study found the challenges, influencing factors, and quality management tools of China's real estate landscape quality management through the literature review. Then, this study interviewed nine real estate landscape project experts to verify the conclusion of the literature review. For the customer demand, which is the most critical factor affecting China's real estate quality management, this study used the questionnaire method to investigate the residents' satisfaction with the landscape quality of phase I of project A and the potential buyers' demand for the landscape quality of phase II of project a. This study collects a large amount of data through mixed methods and verifies each other to ensure the effectiveness of the data. This study promotes Chinese real estate landscape practitioners to use improved quality management tools to implement customer demand-oriented quality management for landscape projects to improve landscape design and engineering quality. That is to provide practical improvement suggestions and methods for China's real estate landscape quality management. Indirectly contributing to solving the existing quality problems, improving the existing quality tools, increasing employees' quality management knowledge, and improving the industry quality standards.

Keywords: Landscape quality management, China real estate, Suggestions, Landscape design quality, Quality management tool

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ABSTRAK

Dengan perkembangan globalisasi dan urbanisasi, permintaan masyarakat terhadap persekitaran bandar dan persekitaran hidup semakin bertambah. Keperluan untuk kualiti reka bentuk landskap menjadi semakin tinggi. Pada masa kini, terdapat pelbagai projek taman yang dibina di seluruh dunia, dan masih banyak taman yang sedang dibina. Ramai pemaju membina projek berdasarkan falsafah perniagaan secara am. Walau bagaimanapun, kebanyakan projek taman ini adalah berkualiti rendah, terutamanya dalam industri hartanah. Untuk membayar semula dana pelaburan, ramai pemaju memilih mod pembangunan berkelajuan tinggi, dan mereka tidak akan mempertimbangkan pengurusan kualiti kejuruteraan landskap. Di bawah persekitaran keperluan berkelajuan tinggi dan beban kerja yang besar, mereka hanya boleh memastikan bahawa kualiti projek landskap memenuhi keperluan yang paling asas. Namun, dengan perkembangan masyarakat, pertambahan keperluan manusia yang pelbagai, yang bukan sahaja perlu memenuhi keperluan asas praktikal dan ekonomi manusia, tetapi juga perlu mengambil kira keperluan semangat dan estetika. Ini juga mewakili standard kualiti landskap, kerana keperluan pelanggan semakin bertambah baik. Pada masa ini, pengamal landskap hartanah menghadapi sejumlah besar aduan tentang masalah kualiti kerana mereka tidak dapat memenuhi keperluan pelanggan. Selain itu, kualiti landskap juga mempengaruhi pembeli rumah membuat keputusan untuk membeli rumah, iaitu jualan rumah pemaju. Oleh itu, pengurusan kualiti landskap hartanah pada masa kini semakin diberi perhatian oleh pembangun projek dan pengguna. Walau bagaimanapun, sering terdapat percanggahan antara keperluan kerja pengamal landskap hartanah dan keperluan pelanggan. Keperluan pelanggan bertambah baik, tetapi pengetahuan pengamal pengurusan projek, terutamanya pengurusan kualiti, tidak

meningkat dengan sewajarnya. Melalui kajian literatur, kajian ini menemui cabaran, faktor yang mempengaruhi dan alat pengurusan kualiti pengurusan kualiti landskap hartanah di China. Seterusnya, kajian ini menemu bual 9 pakar projek landskap hartanah untuk mengesahkan kesimpulan kajian literatur. Bagi menilai permintaan pelanggan, yang merupakan faktor terpenting yang mempengaruhi pengurusan kualiti hartanah China, kajian ini menggunakan kaedah soal selidik untuk menyiasat tahap kepuasan penduduk terhadap kualiti landskap fasa I projek a, dan permintaan bakal pembeli untuk landskap kualiti fasa II projek a. Pengumpulan data di dalam kajian ini ialah melalui kaedah campuran yang mana dapat menigkatkan lagi ketepatan data yang dikumpul. Kajian ini menggalakkan pengamal landskap hartanah di China menggunakan alat pengurusan kualiti yang sudah ditambah baik ketika melaksanakan pengurusan kualiti berorientasikan permintaan pelanggan untuk projek landskap, supaya dapat meningkatkan kualiti reka bentuk landskap dan kejuruteraan landskap. Dengan ini, cadangan dan kaedah penambahbaikan yang berkesan untuk pengurusan kualiti landskap hartanah China juga disediakan. Sekaligus meyumbang kepada penyelesaian masalah kualiti yang sedia ada, penambahbaikan alatan kualiti sedia ada, mempertingkatkan pengetahuan pengurusan kualiti pekerja, dan memperbaiki standard kualiti industri.

Keywords: Landscape quality management, China real estate, Suggestions, Landscape design quality, Quality management tool

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CHAPTER 1 INTRODUCTION

1.1 Introduction

This study mainly through the following order to elaborate:

First of all, the chapter mainly introduces the overall development status of the real estate sector in China's construction industry, which is the macro background of this study. Meanwhile, the related research background of China's landscape projects quality management will be a brief description.

Second, with this background, this study puts forward the most critical problem statement of landscape projects in China's real estate sector.

Thirdly, finding the research aim and objective in terms of the problem statement.

Fourth, describe the specific research methodology and methods used in this research to verify the information and data and review the development process of project quality management, which ensures scientificity, authenticity, and reliability.

Fifth, by comparing the advantages and disadvantages of this research topic and describing the limitations. Expounding the output results of China's construction industry and project management knowledge field shows that this research's boundaries lie in China's real estate sector. Due to the different economic and social environments, regional and cultural, and there are a considerable number of project types, different construction levels, and aesthetic differences in the construction industry, this research makes a statement on the practicability and applicability of the results, which cannot guarantee the international applicability, nor can it guarantee the conclusion of this research is optimized.

Finally, the last part of this chapter is to show the structure of this study, briefly describe the main points, content, and summarise each chapter.

1.2 Research Background

From 2011 to 2020, China's urbanization rate has increased from 51.27% to 64.72% (China’s National Bureau of Statistics, 2021). The data indicated that China is stepping into the middle and late stages of urbanization, with urban agglomeration as the leading new urbanization development form, and China's National Bureau of Statistics (2021) released the data of China's Seventh National Population Census in 2020, which demonstrated the urban population has grown from 691 million to 901.99 million from 2011 to 2020. Feng (2022) demonstrated that Wang Ping Ping, the Director of the Department of population and employment statistics of China’s National Bureau of Statistics, said China's urban permanent population reached 914.25 million at the end of 2021. Hence, the large-scale population migration from rural to urban areas means that this part of the rural population has a strong housing demand in the cities to which they migrate, thus promoting the development of China's real estate projects in cities (Zeng, Zhang & Hu, 2021). Since China successfully joined the World Trade Organization (WTO), China's real estate development is high-speed, both for architecture and landscape, and the demand of consumers is also increasing. China's urban infrastructure, real estate development projects, public buildings, and other projects in China's construction dividend period has been a leap forward growth. In other words, the demand for urban planning and construction, municipal facilities projects, urban renewal, real estate projects, and other kinds of buildings have also increased significantly. Therefore, the construction of urbanization in China has achieved the goal speedily. However, China's construction industry is such an uncontrolled and highly high-speed growth that many Chinese construction industry enterprises ignored numerous problems in landscape architecture projects. For example, the imperfect

management system, the lax control of design quality, and the lack of quantitative construction quality evaluation. Plenty of problems leads to the management imbalance of multitudinous landscape architecture projects in China's construction industry and the abnormal phenomenon of proud high-speed schedule management. Hence, many small and medium-sized enterprises cannot get a standardized development direction in such a market environment. In the end, these enterprises lose competitiveness due to the lack of professional guidance of balanced project management.

China’s construction industry has been affected by China's policies, economy, and globalization in recent years. China’s construction industry has gradually become standardized. The market has constantly stimulated those enterprises that lack competitiveness in recent years. Moreover, The Chinese government uses economic policies to encourage Chinese enterprises to conduct urban construction, urban renewal, and old city reconstruction. The Chinese government avoids China’s enterprise ignoring the historical buildings due to the runaway growth of new construction projects, which shows that China's construction projects are gradually improving quality. This step not only ensures that the construction industry can effective avoid recklessly pursuing fast build speed and ignore the quality of landscape architecture projects, but also update and repair the city's ancient landscape architecture projects to ensure its historical and cultural, and improve the quality of the project to affect the development of the whole construction industry in China, improve the national demand for construction projects, and then raise the industry standard of China's real estate landscape architecture projects.

Moreover, as a financial aid industry of China's economy, the residential area of real estate has been in a period of vigorous development. Under the regulation of China's real estate policy in recent years, the development space of real estate enterprises has been compressed due to the previous abnormal development direction of China’s construction industry, resulting in real estate enterprises having to immediately change

the development direction to ensure competitiveness and market share. As a result, China's extensive real estate enterprises have recently conducted continuous in-depth research and learning with their organizational scale and rich resources. They already solved the problems of the management system, solved the problem that the construction project tends to compress the construction period, solved the problem of excessive project changes due to the neglect of cost management and scope management. The knowledge precipitation produced by these large enterprises through solving problems belongs to the enterprise itself, and the knowledge is generally not shared. Nevertheless, due to the lack of resources, small and medium-sized construction enterprises continue to grope forward on the road of specialization, standardization, conscientization, and marketization. In other words, large real estate companies' research results are the core competitiveness of the organization, and small and medium-sized enterprises grow up in trial and error.

However, in China's construction industry, the standardization development of quality management of many landscape architecture projects is still needlessly slow because of the non-sharing of resources between enterprises. In such fierce competition, China's construction industry needs to establish a new project quality control system in the life cycle of project management.

Domestic and foreign scholars are used to focusing on the construction, post-assessment of landscape architecture projects, cost management and control, and schedule management while ignoring quality management problems. Therefore, this study focuses on the quality management and balanced project management of Chinese real estate landscape architecture projects

1.3 Problem Statements

China's construction industry has experienced more than 20 years of golden development. In recent years, China's construction industry has gradually matured and integrated with the world with the influence of policy regulation and globalization. For landscape projects, Chinese consumers' aesthetic and quality requirements gradually improve. Therefore, China's construction industry has been facing a fierce struggle in recent years, and the whole industry is constantly facing challenges. Major construction and real estate enterprises are gradually changing from the rough development mode of high-speed construction and rapid investment funds recovery to refined, high-quality products. In other words, in order to provide consumers (real estate development projects) and users (public construction projects) with high-quality products, quality management gradually becomes the main driving force for the development of the China government and Chinese enterprises.

1.3.1 Customer Demands

One of the main reasons for the rapid development of Chinese real estate is the Chinese culture. For Chinese people, land or house is the place for Chinese people to "*return to their roots*" and "*settle down*"; real estate is the biggest problem of their livelihood. From 1980 to 2021, China's real estate industry has gradually returned to the rational market from the continuous gold market. In 2020, China Tencent Real Estate.com released the "*2020 real estate consumption report of Chinese house buyers*" through 27511 random samples and extensive data surveys for Chinese consumers. It shows that 89.49% of housing consumers have encountered disputes, 51.44% of housing quality problems, 56.61% of community planning and supporting changes, and 63.58% of contract traps.

The data demonstrated that it is more and more difficult for real estate enterprises to attract customers with inferior products or even ordinary products. Therefore, although the high-speed construction of China's construction industry has developed to the highest achievement, the quality risks are gradually showing in front of consumers with the completion of the projects (Fang, 2016). Consumers are no longer willing to make do with buying a house or a low-quality landscape project in pursuit of the dream of owning a house. Therefore, the quality of landscape projects has become the most critical factor for consumers when they buy a house.

1.3.2 Quality Risks and Problems

Products with quality defects and quality accidents of a project are not caused by a specific reason but by the superposition effect in the whole life cycle of the project. According to '*the Circular of the general office of the Ministry of Housing and urban-rural development on production safety accidents of municipal housing projects in 2019*' issued by the Ministry of Housing and Urban-rural Development of the People's Republic of China, there were 23 accidents with foremost production safety of municipal housing projects and above, with 107 deaths, one more accident, and 20 more deaths than in 2018, with an increase of 4.55%. Among them, there were two major accidents and 23 deaths in 2019.

In summary, the quality of the landscape project was not only reflected in whether the customers were satisfied; whether the final product can be judged as excellent; whether the industry has a high degree of recognition for a landscape project; whether the project tweets are widely forwarded and watched on social media; whether industry experts have come out to interpret and evaluate and so on. The quality of landscape projects is also reflected in the compliance of construction site materials, whether the safety of

construction workers can be guaranteed, and whether the construction materials and engineering projects will affect the environment.

1.4 Research Aim

This study explores the concerns of main stakeholders on the quality of real estate landscape projects of Country Garden Group from different perspectives to find the primary quality management challenges and influenced factors of China's real estate landscape projects.

Thus, the research aim of this study is to find the development direction of landscape project quality management suitable for China's real estate development and put forward practical suggestions to improve the quality management tool for China's real estate landscape practitioners.

1.5 Research Objective

i. To explore the challenges in the quality management of China's real estate landscape projects.

ii. To identify the factor influences of the quality management of China's real estate landscape projects.

iii. To provide suggestions to improve existing quality management evaluation tools for Chinese real estate landscape projects.

1.6 Research Methodology

This study implemented qualitative and quantitative methods, including survey, interview, and literature review. The primary research method of the literature review is to obtain the correct information and achievements confirmed by previous scholars through reading and analyzing the research field related to project quality management

in China, design quality management, construction quality management, and landscape projects review. This study is a comprehensive on-site and off-site study, using the data collected from various aspects to confirm the study objectives. The literature review materials include (but are not limited to) books, journals, articles, research papers, thesis, government website news, and other online/offline resources. The interviewees are experienced Chinese real estate developers, including designers, project managers, and constructors. Questionnaires will be distributed to customers of real estate projects.

1.7 Scope of Research

This study was based on the data and experience of many completed real estate projects, research reports, interviews (top managers, designers, senior managers, construction teams, evaluation teams, and customers), and questionnaires (residents and house buyer of a project of country garden) of China real estate developer Country Garden Group. Therefore, this study can help Chinese real estate practitioners understand the importance of landscape quality management and provide suggestions to improve landscape quality management, to improve the quality of real estate products.

The part about quality management tools mainly studies the tools used by Country Garden Group employees in their daily work. Therefore, this study's findings of quality management tools may not be suitable for other developers.

The target population of the customer satisfaction questionnaire of this study is the customer and potential customers of the Country Garden Group real estate Project A in Guangdong Province, China. Therefore, the geographical scope of this study applies to the real estate landscape projects in Guangdong Province, China, such as real estate project demonstration area, residential area landscape project, residential area boundary landscape, etc., not necessarily applicable to other areas.

Since the information and data are limited to real estate landscape projects, they are not necessarily applicable to other construction projects.

1.8 Significance of Study

The extensive management mode of landscape construction projects in China's real estate development has become an important factor restricting the development speed of China's construction industry. The content of project management in every step of the project life cycle should be paid attention to (Fang, 2016). Practitioners should balance the development between quality management and China's construction industry fields.

The research of this study makes up for the lack of quality management knowledge in the project cycle, and the study outputs particular reference significance for improving the quality management of landscape architecture projects in China's real estate industry in the future.

According to the analysis of typical cases, it is easier to take adequate measures according to the specific situation. Project quality is an essential factor for the success or failure of project construction. If project quality management does not play an essential role in project construction, project management will not be effective.

This study is to improve the Chinese construction practitioners, especially the practitioners in the real estate industry, for the quality management of landscape construction project management, enhance the awareness of stakeholders for quality management in each link and stage, enhance the participation of stakeholders for quality control in the process of project construction, and play an essential role in the smooth construction of landscape construction projects. Standardizing the quality management system of Chinese real estate landscape projects and balancing the project management

of the whole project cycle. Therefore, the paramount significance of this study lies in the following points:

i. To sort out the development of the real estate quality system and improve the quality control of the China real estate landscape project.

ii. To improve the quality standards of landscape projects in China's real estate sector and balance the knowledge field of project management.

iii. To study various countries' mature quality management tools, refine and combine into a quality management tool suitable for China real estate landscape project.

iv. To ensure the overall quality of the project and reduce the design changes due to quality management.

1.9 Structure of Thesis

This study is divided into seven chapters to discuss, which analyses the background of China's construction industry and China's real estate sector at first. It then discusses the differences between the project quality management of landscape projects in China's real estate sector and that of China and foreign countries and studies the development and achievements of its quality management. Then the quality management of the Chinese real estate landscape projects is analyzed in detail to find the quality management tool or quality evaluation system in line with the Chinese and Chinese real estate sectors. After reading the literature, studying the quality management of some excellent real estate landscape project cases at domestic and abroad; interviewing the real estate landscape experts in order to find out the main challenges and influencing factors of the landscape projects quality; studying and analyzing the existing quality management system or quality management tools; describing the improvement methods

and suggestions for the quality issues, and proposing some appropriate suggestions for quality management and quality management tool for China's real estate landscape projects. And then to verify whether the research results of this study can be established while solving the existing problems, promoting an improved tool and methods to apply to the future Chinese real estate landscape project, avoiding quality problems, and reducing the design changes caused by quality problems. Finally, summarizing the arguments and research result; analyzing the practicability, applicability, and limitations; and providing the quality management tool and future research direction of Chinese real estate landscape projects.

1.9.1 Chapter One: Introduction

Describing the research background of this study, putting forward the corresponding problem statements, research aim, and research objectives based on the current background of China's real estate sector; introducing the research methodology; determining the research scope; and stating the significance of this research, and finally making a general summary of the whole study structure and the content of each chapter.

1.9.2 Chapter Two: Literature Review

The literature review includes the keywords, landscape project background of China's real estate sector, and problem statement.

1.9.3 Chapter Three: Research Methodology

Explain the methodology of this study, introduce the research design process, describe the research strategy of this study, explain the sampling techniques used, and briefly introduce the methods of data collection and data analysis.

1.9.4 Chapter Four: Data Analysis

Describe the analysis of qualitative and quantitative data collected through interview and Questionnaire A and questionnaire B, respectively.

1.9.5 Chapter Five: Discussion

Discussed in detail the qualitative data collected by the interview and the quantitative data collected by the questionnaire.

1.9.6 Chapter Six: Conclusion & Recommendation

The last chapter presents the main conclusions of this study, contributions, research limitations, and recommendations for future scholars.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter is the literature review of the related fields of this study. Through the collection, evaluation, and integration of relevant literature in the research field of China's real estate landscape architecture project, this study expounds on the technology development, knowledge development, achievement development, and future market trend of China's real estate landscape architecture project. This chapter will highlight the knowledge achievements that have been completed and generally accepted. Based on the previous research on Chinese real estate landscape architecture projects, the research direction of this study is explored. This chapter summarises the unsolved quality problems and quality research gaps in real estate landscape architecture projects in China through several literature reviews to find the possible research direction in the future.

In other words, this chapter elaborates the amount of literature review, listing the achievements, research methods, and research purposes of other scholars in the landscape project quality management and determining the research direction of this study by summarising the previous scholars' research results.

2.2 The Key Words Definition

This section describes the keywords related to this study, and its primary purpose is to express the content of the literature theme. The following keywords help to outline the topic and direction of the study.

2.2.1 Definition of Project Management

Project management refers to using the system science method to plan, organize, and coordinate the whole project from the beginning to the end to achieve the project objectives under the condition of limited resources (Wu, 2021).

2.2.2 Definition of Project Quality Management

Project quality management is a part of project management. Generally, it is a series of quality control to meet the project's quality requirements (Tao, 2015). Quality management ensures that an organization, product, and service are consistent. It has four main components: quality planning, quality assurance, quality control, and quality improvement (Lu, 2016). For example, the quality management of construction engineering refers to the systematic management means of organization, coordination, and control of all construction links and stages adopted by construction products in order to build products to achieve a specific purpose or characteristics and meet the quality requirements of specifications, designs, and standards (Sun et al., 2017).

2.2.3 Definition of Landscape Project Definition

The landscape project is a multi-disciplinary field incorporating urban design, architecture, geography, ecology, civil engineering, structural engineering, horticulture, environmental psychology, industrial design, soil sciences, botany, and fine arts. It is the design of outdoor areas, landmarks, and structures to achieve environmental, social-behavioral, or aesthetic outcomes. Chen (2012) described that landscape architecture means a building uniquely placed in the beautiful scenery. It can be seen that landscape was closely related to architecture when it first appeared (Yao, 2006).

2.2.4 Definition of Quality Evaluation Tool Definition

Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. It can assist an organization, program, design, project, or any other intervention or initiative to assess any aim, realizable concept, and proposal, or any alternative, to help in decision-making; or to ascertain the degree of achievement or value regarding the aim and objectives and results of any such action that has been completed (Yao, 2006). In addition to gaining insight into prior or existing initiatives, the primary purpose of an evaluation is to enable reflection and identify future change (Lu, 2016).

2.2.5 Summary of Key Definitions

The above definitions can be concluded that, first, the rapid development of China's real estate was also accompanied by the development of project management in China's real estate industry. The practitioners of Chinese real estate usually have to consider managing multiple sizeable real estate projects simultaneously. If they can combine the actual real estate project experience and project management theory, they can promote the development of project management suitable for China's real estate industry and help them better promote their work to ensure the success of each project. Secondly, China's real estate development also means that product standards are constantly improving. The value of real estate projects needs to be seen by customers and willing to buy product value, which also shows that the attention to quality is gradually improving. Therefore, the quality management of Chinese real estate landscape projects needs to be paid attention to, and the quality evaluation tool plays a significant role in quality management. Therefore, this study focused on China’s real estate landscape project quality management.

2.3 Quality Management in China & Abroad

2.3.1 Background of Quality Management in China

The research on China's project quality management system was later than most developed countries. From the founding of new China to 1978, China's construction quality management began to receive more and more attention (Lu, 2016). Until the end of the 1970s, China introduced the total quality management theory (TQM) from Japan. Furthermore, in 1985, the relevant departments issued the total quality management method for industrial enterprises. Total quality management has been implemented in China (Wu, 2017).

From 1980 to 2019, the real estate sector of China has been developing rapidly for forty years, which is consistent with the economic take-off of China's reforming (Zhang & Zhou, 2011). The real estate sector has been booming in the environment of China's rapid economic growth. Similarly, the growth of the real estate industry has also made outstanding contributions to China's economic development. According to China's real estate sales data of China's National Bureau of Statistics in 2018, the annual sales area of commercial housing in China was 1716.54 million square meters, with a year-on-year growth of 1.3%, and the sales reached 14997.3 billion yuan, with a year-on-year growth of 12.2%. The GDP of the real estate industry reached 5986.4 billion yuan, with a year-on-year growth of 3.8%, accounting for about 6.6% of the total national GDP.

China's construction speed has developed rapidly during this period, named the acme. Although many scholars have studied quality management in the past forty years, most find the problems existing in the project quality and find the influencing factors of the project quality. Secondly, because of the problems exposed in the whole industry, combined with their own experience, put forward the improvement methods and measures of project management (Wu, 1997). However, because China's construction

industry has paid too much attention to the construction speed and compressing the schedule of a project life cycle, resulting in the imbalance of project management, quality management has not made remarkable achievements.

Wu (2017) further suggested that project managers should firmly grasp the basic theory of relevant technology and enhance management ability to ensure project quality. Dang and Wu (2004) elaborated the project quality control measures from people, materials, technologies, and site management and explained the influencing factors of quality management and the characteristics of project quantity management. Moreover, Dang (2004) further indicated that quality management needs to meet owners' legal requirements and technical specifications. Ren and Jiang (2010) emphasized that quality management lies in the engineering product itself. Li and Liu (2016) said that quality management is reflected in the project itself and the whole process of the project. Zhou (2016) further said that the quality of the project is affected by five factors: people, materials, technology, management methods, and environment. Wang (1999) stated that improving housing design quality is adequate to strengthen housing construction quality. Wang (2008) added that the quality management of housing construction should strengthen the contract management, standardize the bidding work, and strengthen the quality management of construction enterprises to strengthen the management and supervision of housing construction. The quality management of construction enterprises is the core factor affecting the housing quality (Wang, 2010). According to Cui (2017), it is expected to improve the construction quality by improving human factors, materials, and equipment. Zhou et al. (2017) explained that according to the shortcomings of today's landscape engineering, analyzed the season, material, professional and technical level are the influencing factors of the quality problems of today's landscape engineering. Li (2017) emphasized that the quality of landscape architecture engineering can be evaluated from design theme, ecology, humanistic and

construction materials. Therefore, establishing a suitable evaluation mechanism was necessary for China's construction industry.

2.3.2 International Quality Management

Project management developed earlier in the United States and the United Kingdom, and its practice and theory have been mature for a long time. Among them, the representative systems of project management theory are the American project management system represented by Project Management Institute (PMI), the British project management system represented by Association for Project Management (APM), and the international organization for standardization project management system represented by International Organization for Standardization (ISO) (Lin, 2009).

Founded in 1969, PMI of the United States is the leading global project management organization, and its main achievement is PMBOK (Lin, 2009). The British project management system mainly considers the environmental factors in project management. The impact systems company put forward this method in 1975 (Zhang & Zhou, 2011). It mainly manages the construction project process, creates the process model, divides the construction type, and explains the content of each process management in detail. This method improves the efficiency of the original management mode (Lu, 2013).

Nowadays, with the development of science and technology, many countries have an increasing demand for their project management, and they are constantly changing based on PMI and APM's research on project management, adjusting methods to keep pace with the times. Therefore, project management still has excellent development prospects.

2.4 Quality Management Development Challenges in China

By comparing the theory and practice in the field of quality management of project management in China and abroad, it is found that the main quality management development problems in China, which were challenges that restrict the development of China's real estate landscape quality management, the main four challenges, as follows:

2.4.1 Challenge 1. Lack of Theoretical Maturity Support

China's project management-related theoretical research was immature, unscientific, unsystematic, and nonnormative (Wu, 2017). Due to China's unique development direction and economic system, there is no way to directly apply foreign mature project management theory to solve practical problems. Moreover, much research in China only focuses on theoretical and model research, which is not well combined with practical problems, and there is no support from specific construction cases (Zhang & Zhou, 2011).

2.4.2 Challenge 2. Shortage of Quality Management Knowledge

Most construction enterprises in China use traditional methods to manage construction projects. For example, the division of labor among design, construction, and owners is very professional. The designers only focused on design, but the construction was not following the drawings. There is no communication and coordination between them (Zhu, 2009). This management method leads to many difficulties for owners. Different participating units, such as design, construction, and supervision, have different goals and interests for the project. The relevant management personnel of the owner needs to systematically grasp these situations and coordinate with all parties, which is a difficult task. It was effortless to shirk responsibility once an accident or project problem occurred.

2.4.3 Challenge 3. Excessive Intervention by the Design Department in Project Management

China's construction industry takes practice as the main body, especially the design institution, and many managers lack management ability, which is not conducive to the development of employees (Yin, 2014). The design units and construction units in China are mostly the practice subjects of project management, and the management methods are relatively rough. Due to inefficient management, the energy consumption of grass-roots staff is severe (Miao, 2018). However, foreign countries' main project management body is mostly construction consulting companies or companies primarily responsible for the management. In contrast, in China, due to the limited design qualification, the main body of project management is still the design unit; that is, the designer dominates the project process (Yang, 2014). In recent years, due to the competitive pressure of the real estate industry in China, design units have won high-quality design quality by consuming the labor force of grass-roots staff through "wolf culture"(Dong, 2015). However, due to the lack of experience in construction management quality, material quality, and procurement quality, the design drawings are brutal to show as expected in the construction stage (Sun and Hou, 2016). Moreover, due to the lack of experience in management tools, methods, and technology of design units, there are serious internal friction and a high turnover rate of personnel, resulting in considerable contradictions in the design industry.

2.4.4 Challenge 4. The Difficulty of Promoting Information System Management

In the process of foreign engineering construction, most of them use digital means, which reduces the cost and helps to improve the work efficiency (Yin, 2014). Although China's digital development is swift, information technology has been widely used in many industries to reduce the cost of human control. However, the digital promotion of

China's construction industry has been unable to popularise. For example, BIM has been implemented in China for a long time, but it has not achieved any results for many years (Miao, 2018).

To sum up, the quality management of landscape projects refers to a series of quality management methods and activities to ensure and improve project quality. The quality of project management is related to the enterprise's development, the project's success, and the development of designers and builders.

The characteristics of landscape projects were a generally significant investment and a long construction period. If the quality cannot meet the production and life cycle requirements, and there are many potential safety hazards, the project cannot be put into production or use. (Wang, J., 2014).

Generalized quality management refers to the quality management of the whole process of the project. Generally, in China's construction industry, especially the real estate sector, quality management mainly refers to the management in the construction stage (Sun and Hou, 2016). Nevertheless, quality has long been regarded as the core element throughout the process of a project life cycle in other countries (Zhu, 2009). Many countries attach great importance to project quality requirements throughout the world. First of all, in order to ensure the correctness of the design documents, and on this basis, combined with professional advanced technology and management methods to establish a set of the quality management system and tools, in order to ensure that the completed project meets the standards and user requirements (Yin, 2014). Project quality management should solve quality problems in the early stage. Focus on the prevention of quality problems, study and prevent the problems that may appear in all critical links of the whole process, strictly control the quality, turn the post-inspection into prevention and correction, start to evaluate the quality risk before each stage, try to consider the

plan of possible situations, and turn the correction results into finding and solving problems, Mobilise everyone's enthusiasm, full participation, the whole process management, using systematic theory, scientific methods to make the whole process of engineering construction under control (Wu, 2017). In other words, improving the quality management of landscape construction projects in China's real estate industry is the most important for developing China's construction industry. With the help of international advanced theories and tools, combined with the particular situation of Chinese construction projects, a set of information tools suitable for quality evaluation with Chinese characteristics is developed (Dong, 2015) (Miao, 2018). The use of information tools in the whole stage of the project is conducive to the timely monitoring and quality management of the project by stakeholders.

2.5 Chinese Real Estate Landscape Project

Real estate landscape project refers to the landscape project with a commercial purpose, business value, and benefits orientation, which real estate developers construct as prominent investors. In the past, the Chinese ignored the concept of landscape, landscape as an inseparable accessory from architecture. The real estate landscape architecture project was composed of buildings, plants, and water. The multi-entities formed by these elements were classical China real estate landscape architecture projects (Wei, 2017). At present, China's real estate sector, as a pillar industry of the national economy and people's livelihood in China, has become saturated. The growth rate of real estate sales is slowing down, the inventory of houses is rising, the China real estate sector has a downward trend, and the development speed slows down compared with the previous period. The landscape is an essential part of a real estate project, and it also faces challenges and transformation opportunities (Chen, 2020).

With the gradual improvement of Chinese people's life and aesthetic needs, customers' demand for real estate landscape projects is more comprehensive. In 2017, the primary part of the China real estate project was still architecture. The main components of a real estate project were overall architecture: the community planning, residential functional area, room type, and building (Li, 2017). Hu (2018) defined the boundary between landscape and architectural projects based on building. Although the definition of landscape projects was broad, the Chinese construction industry has regarded landscape as an independent term rather than an architecture accessory. Yu (2019) stated that real estate project practitioners must have an overall view of who should regard the project as one entity and comprehensively consider the six aspects of greening, transportation, energy, function, culture, and space. Therefore, the importance of landscape was gradually highlighted. Customers' demand rapidly changed from primary physiological and safety demand to higher social demand, respect demand, and self-demand. Ren (2020) explained that due to Covid-19, customers pay more attention to the high-quality real estate landscape project, especially the increased demand for epidemic prevention. Therefore, in the current situation, China's real estate landscape projects are in the transformation stage to meet the needs of stakeholders (Xu, 2020).

To sum up, the current China real estate landscape project mainly refers to plant space, water, open floor, landscape sketch, and building structures. It provides users with external space for outdoor activities, sightseeing, leisure, and interpersonal communication. At the same time, the real estate project contains a landscape environment composed of outdoor plants, water bodies, elevated floors, landscape furniture, and outdoor decoration. It can provide residents with particular functions, such as outdoor activities, sightseeing, leisure, interpersonal communication, and external space of space boundary (Yu, 2020). The most significant feature of the real estate landscape is that it can help the real estate project add business value and build a

brand for the developer. The real estate landscape is a critical element to improve the quality of living, and it is also the most concerned hot spot of customers in current real estate projects in China (He, 2020).

2.6 The Influencing Factors of China's Real Estate Landscape Project Quality Management

China's real estate is a commercial entity, which is high capital-intensive. The developers' fundamental survival and organizational goal are to obtain profits (Sun, 2021). Furthermore, due to China's large population and rapid urbanization, the number and volume of real estate projects in China were usually large, leading to Chinese real estate developers' high premium and high turnover development model. That is to say, the real estate developers of China usually expand rapidly through high liabilities and then recover funds through the rapid opening, then proceed to the next round of development (Zhang, 2020). The high turnover real estate development mode always brought many quality risks and problems. These quality problems might usually not be found by customers immediately, usually, after delivery, which was also one of the reasons for the complaints and changes of the project due to the quality problems complained by customers (Zhang, 2020). This section was also discussed in Chapter 1 Proposal Statements.

From the above description, it can be seen that the quality of Chinese real estate landscape projects was affected by two factors: Chinese real estate developers' quality management and customer demands (Liang, 2021). The impact of developers on quality lies in the quality management planning in the project stage (Zhang, 2020), while the impact of customers lies in their ability to give higher value to the real estate projects (Lu, 2018) (Ma & Zhu, 2021).

2.6.1 Factor 1. The Poor-Quality Management in Landscape Project Planning

The high turnover mode of China real estate was to speed up the capital turnover and shorten the project development and construction cycle, which led to many contradictions between the overall project quality management and the demand for the construction period (Ge, 2021). First of all, in order to meet the early-stage objectives of rapid land acquisition and quick sales, the quality management in project planning was inaccurate, which was challenging to play a practical guiding effect on the actual development and construction of the projects (Ge, 2021) (Wang, 2021), and also led developers to pay more attention to the risk of capital and ignore the quality risk. Secondly, the design cycle was shortened (Zhao, 2020), it was challenging to ensure the quality of design drawings and construction drawings, the error rate of design increased, changes increased, and it also was difficult to follow up the adjustment and change speed (Ge, 2021), which led to many quality problems that are difficult to solve in the construction of landscape projects. Thus, Practitioners of real estate landscape projects usually lack the guidance of any quality management plan to solve these problems when they encounter quality problems (Sun, 2021) (Liang, 2021).

Moreover, these quality problems usually cause the contradiction between the designer and the constructor, affecting the project quality. Moreover, the long-term high-speed rush also led to the lack of control over the construction process and construction details, resulting in a particular gap between the overall quality of the actual construction of the project and the quality goal of high-quality positioning of the project (Sun, 2021). Therefore, developers' poor quality management planning in the planning stage of real estate landscape projects led to many quality risks and problems in the project quality itself. Hence, it can be considered that the quality problem of the project essence quotient was one of the main factors that affected the quality of real estate landscape projects (Zhang, 2020).

2.6.2 Factor 2. Customer Demands

People's requirements for the quality of life have gradually increased, resulting in the quality of the real estate landscape becoming the focus of property buyers and developers (Ma & Zhu, 2021). The natural and social attributes of landscape projects were gradually fully reflected in real estate projects, providing brand competitiveness and prominent selling points of publicity and sales for real estate projects, thus affecting consumers' purchase behavior (Gan, 2019) (Sun, 2021).

Generally, Chinese developers conducted a series of research before developing a real estate project. Xu (2019) & Wang (2021) stated that these research were usually project site research, market environment research, and market supply-demand relationship research.

i. **The Project Site Research**: mainly included the climatic conditions of the project construction site, land geotechnical structure, surrounding environment of the plot, traffic conditions, relevant municipal supporting facilities, and surrounding buildings (Zhao, 2020).

ii. **Market Environment Research**: an uncontrollable factor for developers because the global market environment was usually restricted and affected enterprises' market activities and business activities. The research contents include policy and legal environment, economic environment, social and cultural environment, and urban market environment (Sun, 2021).

iii. **Market Supply & Demand Research**: the market supply and demand have the most significant impact on developers to achieve their interest goals (Xu, 2019). The market supply and demand research needs to understand three aspects: consumer

composition, consumer purchase power, and consumer purchase behavior (Liang, 2021).

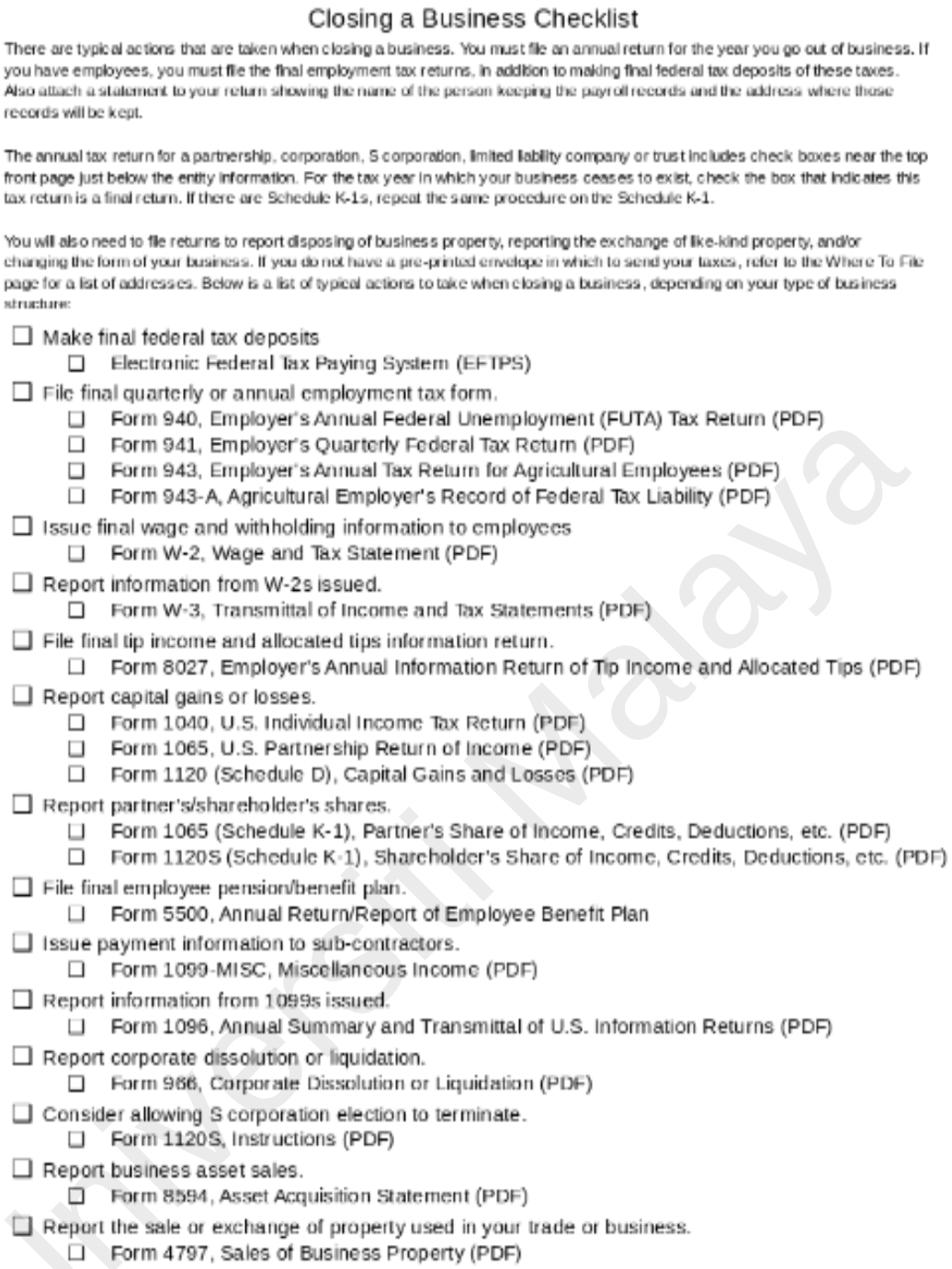
As mentioned above, it can be seen that the demand of customers has a significant influence on the project positioning and project quality management of developers, and the previous section also mentioned that the attention and demand of Chinese customers for Chinese real estate landscape projects are gradually increasing. Therefore, As a factor affecting the quality management of China's real estate landscape, customer demand determines whether the organization can achieve its economic benefit objective (Gan, 2019).

2.7 Quality Management Tools in China Real Estate Industry

At present, there are seven main quality management tools in China's construction industry: Checklist tool, Pareto tool, Causality analysis tool, Hierarchical tool, Scatter Diagram tool, Histogram tool, and Control Chart tool.

2.7.1 Checklist Tool

The checklist tool collects data according to quality management, then lists the data in the form of charts after confirming that the data are valid, and finally sorting them into a checklist form (Shi, 2007). It was also named as Inventory and statistical analysis table. Managers can use different forms according to various quality management purposes and projects. The Chines real estate developers commonly used a complete project checklist, project quality influencing factors checklist, and quality checklist of divisional and subdivisional projects of Checklist tool (Yan, 2016) (Figure 2.1).



Closing a Business Checklist

There are typical actions that are taken when closing a business. You must file an annual return for the year you go out of business. If you have employees, you must file the final employment tax returns, in addition to making final federal tax deposits of these taxes. Also attach a statement to your return showing the name of the person keeping the payroll records and the address where those records will be kept.

The annual tax return for a partnership, corporation, S corporation, limited liability company or trust includes check boxes near the top front page just below the entity information. For the tax year in which your business ceases to exist, check the box that indicates this tax return is a final return. If there are Schedule K-1s, repeat the same procedure on the Schedule K-1.

You will also need to file returns to report disposing of business property, reporting the exchange of like-kind property, and/or changing the form of your business. If you do not have a pre-printed envelope in which to send your taxes, refer to the Where To File page for a list of addresses. Below is a list of typical actions to take when closing a business, depending on your type of business structure:

- ☐ Make final federal tax deposits
  - ☐ Electronic Federal Tax Paying System (EFTPS)
- ☐ File final quarterly or annual employment tax form.
  - ☐ Form 940, Employer's Annual Federal Unemployment (FUTA) Tax Return (PDF)
  - ☐ Form 941, Employer's Quarterly Federal Tax Return (PDF)
  - ☐ Form 943, Employer's Annual Tax Return for Agricultural Employees (PDF)
  - ☐ Form 943-A, Agricultural Employer's Record of Federal Tax Liability (PDF)
- ☐ Issue final wage and withholding information to employees
  - ☐ Form W-2, Wage and Tax Statement (PDF)
- ☐ Report information from W-2s issued.
  - ☐ Form W-3, Transmittal of Income and Tax Statements (PDF)
- ☐ File final tip income and allocated tips information return.
  - ☐ Form 8027, Employer's Annual Information Return of Tip Income and Allocated Tips (PDF)
- ☐ Report capital gains or losses.
  - ☐ Form 1040, U.S. Individual Income Tax Return (PDF)
  - ☐ Form 1065, U.S. Partnership Return of Income (PDF)
  - ☐ Form 1120 (Schedule D), Capital Gains and Losses (PDF)
- ☐ Report partner's/shareholder's shares.
  - ☐ Form 1065 (Schedule K-1), Partner's Share of Income, Credits, Deductions, etc. (PDF)
  - ☐ Form 1120S (Schedule K-1), Shareholder's Share of Income, Credits, Deductions, etc. (PDF)
- ☐ File final employee pension/benefit plan.
  - ☐ Form 5500, Annual Return/Report of Employee Benefit Plan
- ☐ Issue payment information to sub-contractors.
  - ☐ Form 1099-MISC, Miscellaneous Income (PDF)
- ☐ Report information from 1099s issued.
  - ☐ Form 1096, Annual Summary and Transmittal of U.S. Information Returns (PDF)
- ☐ Report corporate dissolution or liquidation.
  - ☐ Form 966, Corporate Dissolution or Liquidation (PDF)
- ☐ Consider allowing S corporation election to terminate.
  - ☐ Form 1120S, Instructions (PDF)
- ☐ Report business asset sales.
  - ☐ Form 8594, Asset Acquisition Statement (PDF)
- ☐ Report the sale or exchange of property used in your trade or business.
  - ☐ Form 4797, Sales of Business Property (PDF)

Figure 2. 1: Checklist Tool Sample (Kaoru, 1986)

2.7.2 Permutation Chart Tool

The permutation chart tool is an essential tool to help catch the key points of quality management. Its primary purpose is to find out the leading causes of quality problems (Lin, 2013). The Permutation chart had been proposed based on the statistical chart of

Italian economist Pareto by the famous American quality management expert, Dr. Joseph M.Juran, so it is also called the Pareto chart (Wang, 2008). The application of permutation chart can determine the leading causes of quality problems to help managers set improvement goals and solve problems. Finally, the situation before and after is compared to confirm that the improvement effect is positive (Liu, 2013) (Figure 2.2).

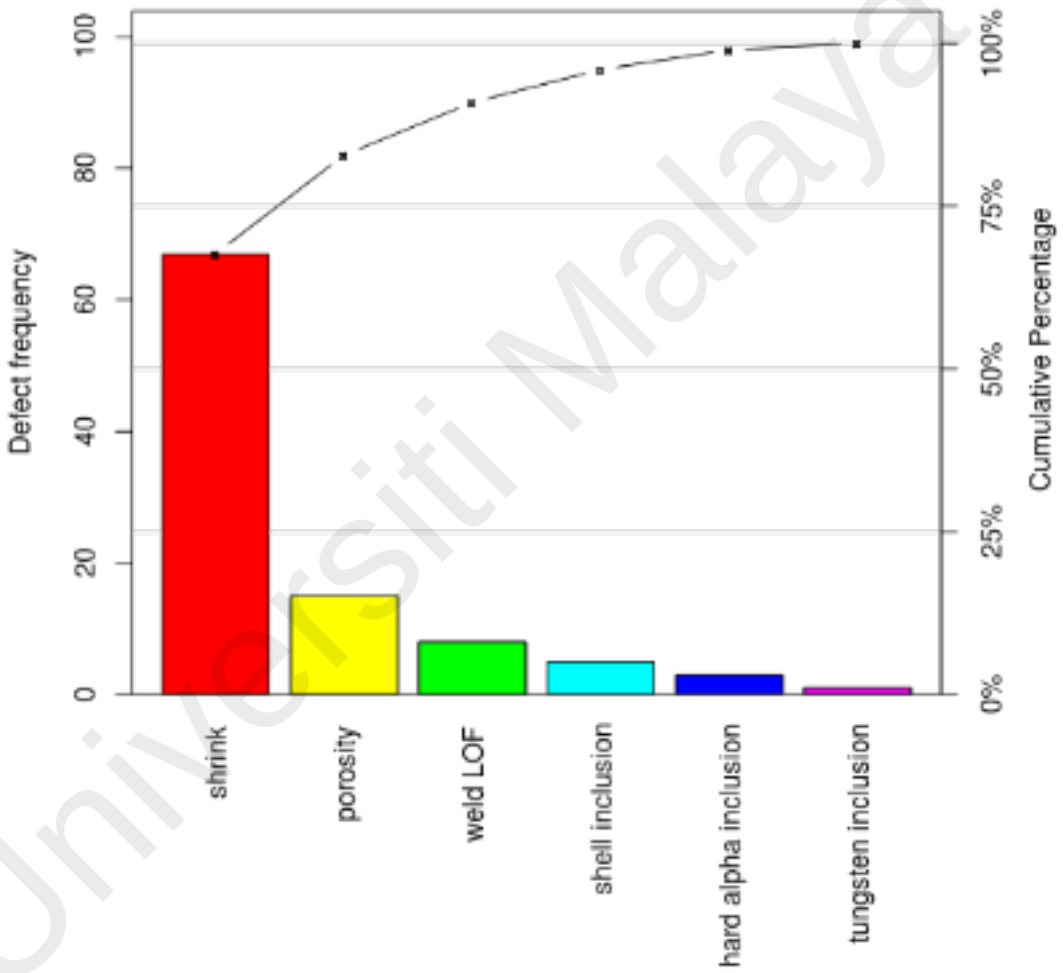


Figure 2. 2: Permutation Chart Tool/ Pareto Chart Tool Sample (Wilkinson, 2006)

2.7.3 Causality Analysis Tool

Causality analysis is a tool to find the cause according to the result. The central arrow points to the quality problems that need to be studied and solved in the causal analysis tool. The relevant reasons and influencing factors at different levels are summarized around the arrow (Wang, Guo & Liu, 2013) (Figure 2.3).

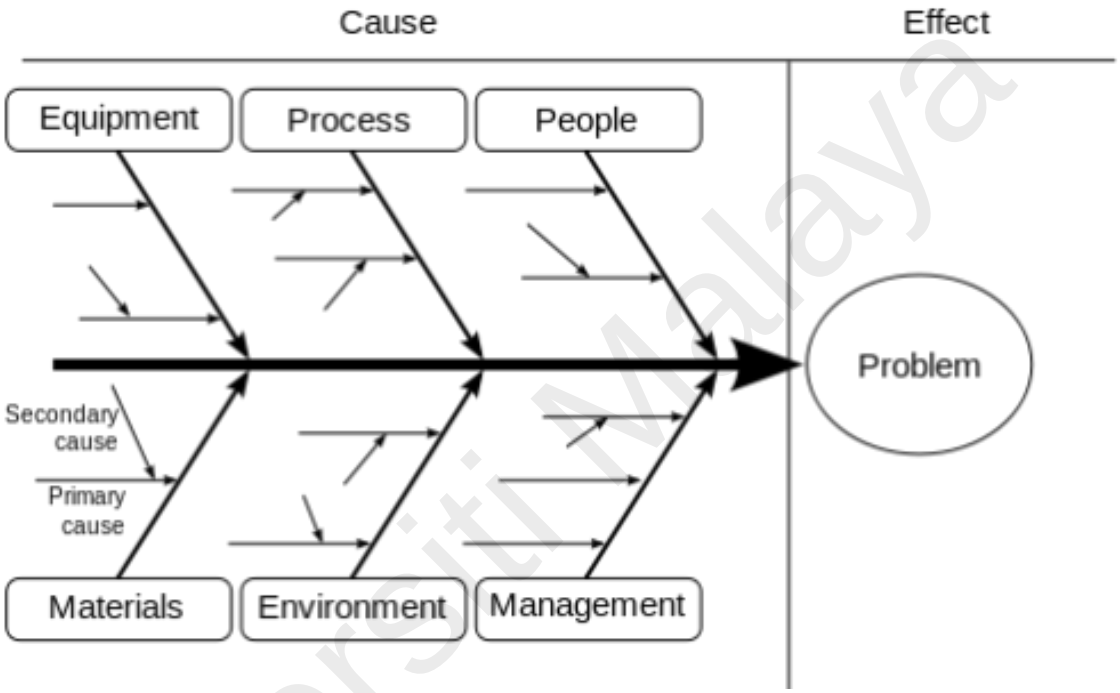


Figure 2. 3: Causality Analysis Tool Sample (Kaoru, 1976)

2.7.4 Hierarchical Tool

The hierarchical tool can classify different data types according to their quality management purposes to find their specific regular pattern (Talib, Rahman & Qureshi, 2011). It can be used alone or combined with the permutation chart, histogram, Causality analysis, Control Chart, scatter chart, and other quality management tools for comparative analysis (Zhang, Fu & Wang, 2013) (Figure 2.4).

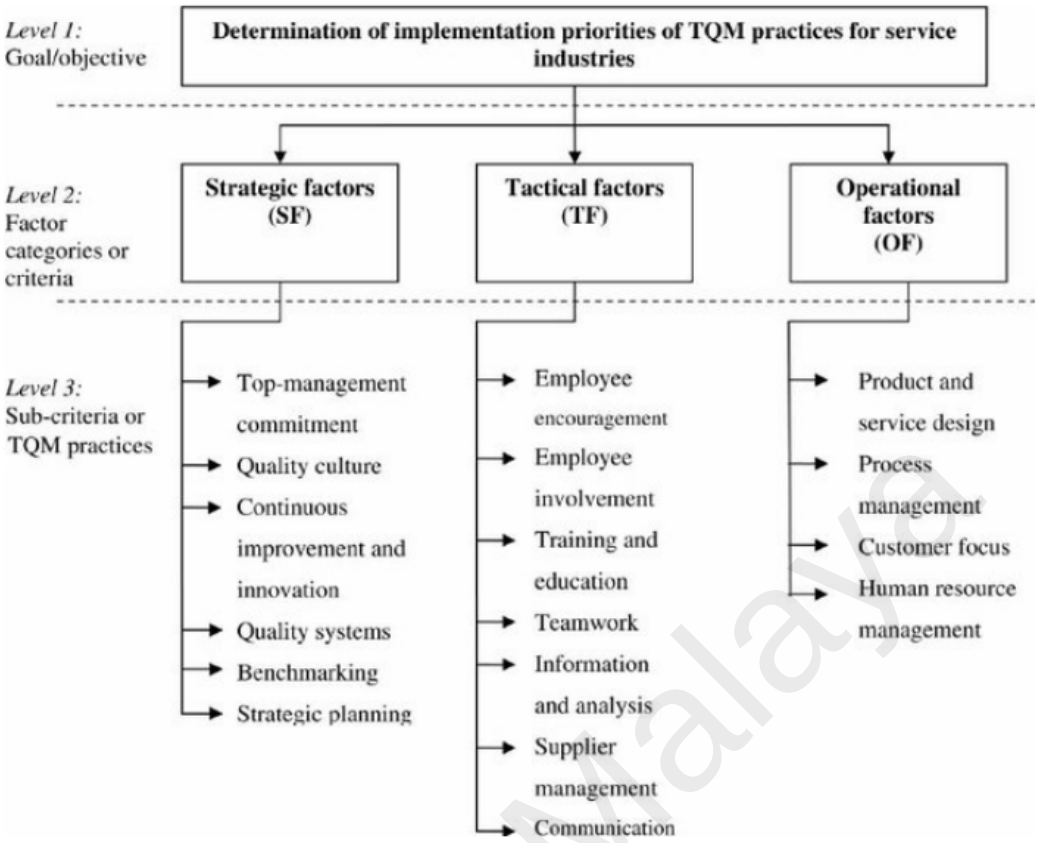


Figure 2. 4: Hierarchy Tool Sample (Talib et al., 2011)

2.7.5 Scatter Diagram Tool

The Scatter diagram is also known as a correlation diagram. After implementing quality management measures, the relationship between quality problems and influencing factors can be found through the scatter diagram (Lin, 2013). The Scatter diagrams can also show whether these relationships are strong or weak to summarize the experience and lessons. It helps guide future quality management (Figure 2.5).

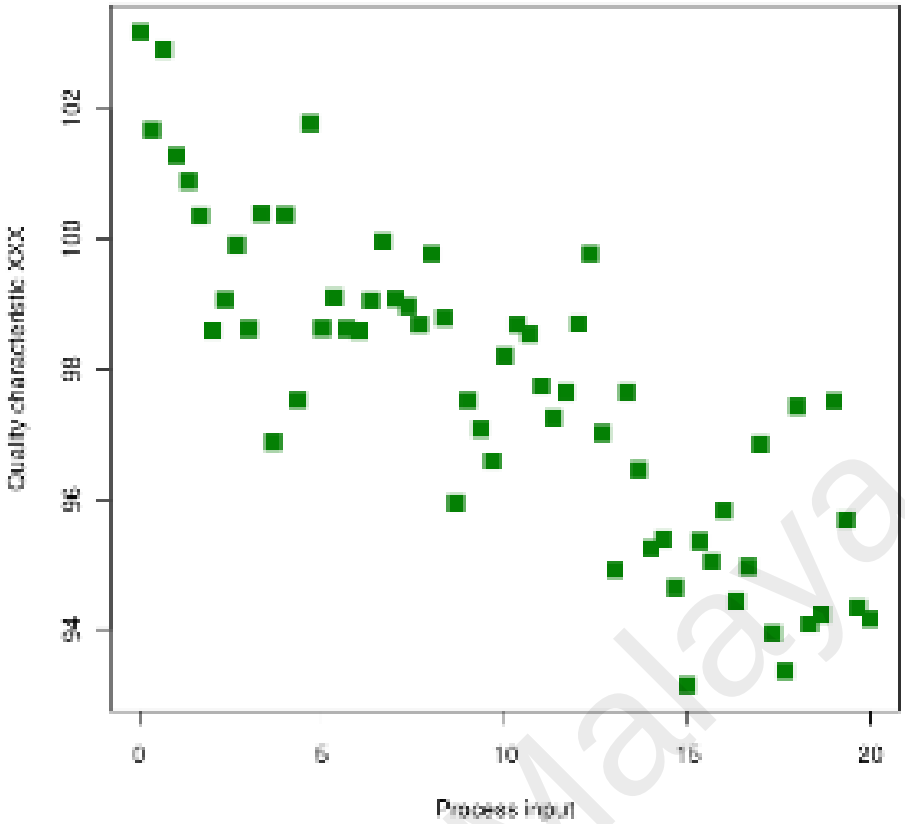


Figure 2. 5: Scatter Diagram Tool Sample (Dan,2005)

2.7.6 Histogram Tool

It is mainly used for statistics and collating many survey data. The statistical data is placed on the coordinate axis in the form of a rectangle, which can help to judge the distribution of quality problems. The essential construction capacity can be evaluated in actual landscape projects by comparing the actual distribution with the standard distribution (Hou, Shi & Chen, 2020) (Figure 2.6).

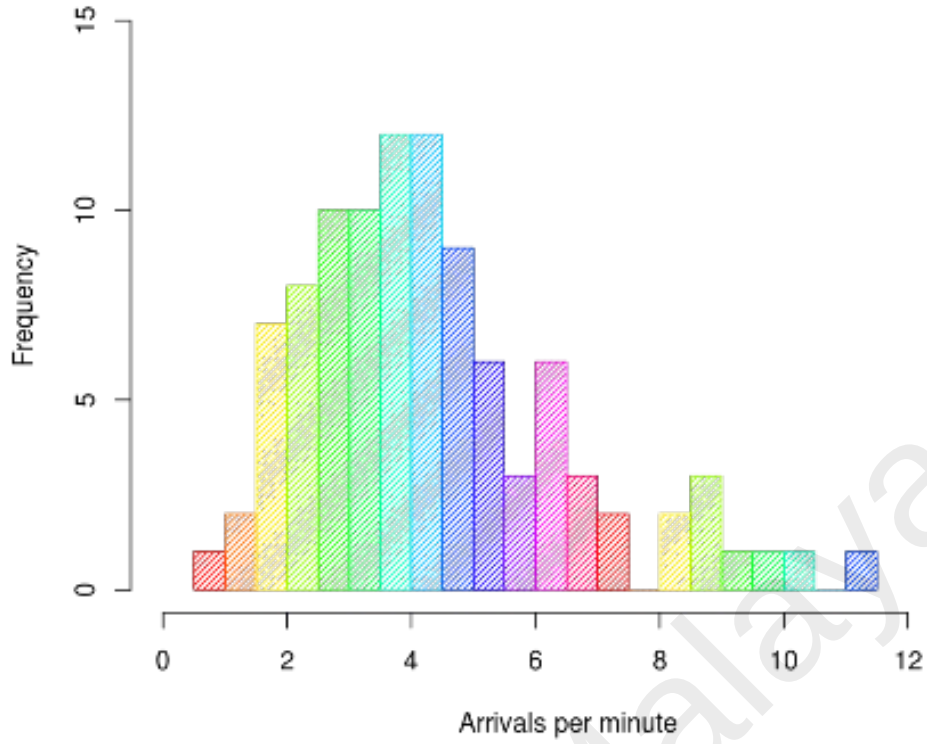


Figure 2. 6: Histogram tool Sample (Tague, 2004)

2.7.7 Control Chart Tool

Control chart, also known as management chart or Shewhart chart. It can help analyze whether the current quality management process is stable by observing the changes of characteristic quality values with time. The control chart is a tool to guide managers to choose appropriate quality management measures (Hou, 2012).

The above seven quality management tools are commonly used for different purposes in China's construction industry. The checklist tool is mainly used to collect data for analysis and inspection; The Permutation chart tool can quickly determine the critical factors according to the permutation results after the permutation of many factors affecting quality management (Lin, 2013). The causality analysis tool determines the primary and secondary causes of quality problems. The hierarchical tool can be used

alone or combined with other tools to classify the data and facilitate the analysis of statistical laws (Zhang, Fu, Wang, 2013). The scatter diagram tool is used to confirm the correlation between two variables. Histogram tool can intuitively demonstrate the distribution information of quality characteristics (Hou, Shi & Chen, 2020). The control chart is used to indicate whether a particular quality phenomenon is usual to determine the solution (Hou, 2012). However, the checklist tool is widely used by Chinese real estate practitioners. (Xie, 2020) (Figure 2.7).

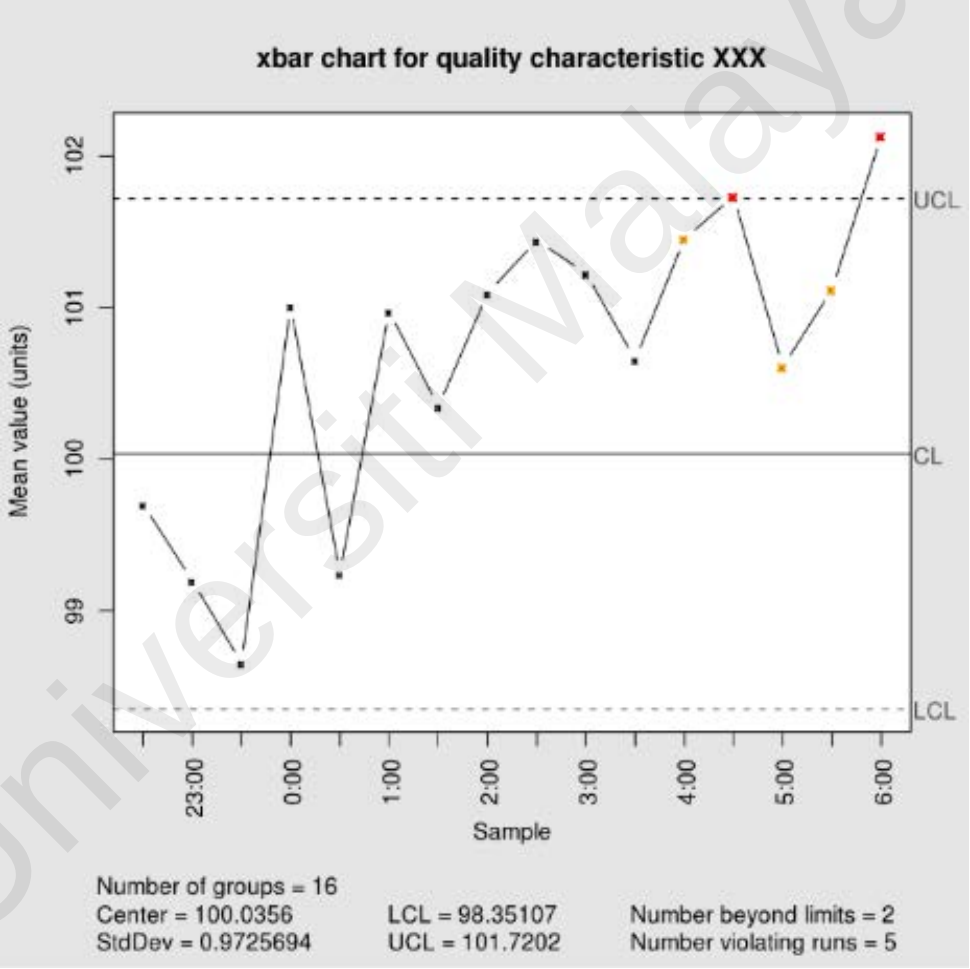


Figure 2. 7: Control Chart Tool Sample (Tague, 2004)

2.8 Conclusion of Literature Review

2.8.1 Contribution of Literature Review

This study found four challenges, two influencing factors, and one management tool of China's real estate landscape project quality management through detailed Literature Review as above, which also answered the three Research Questions of Chapter 1 this study and realized Research Objective 1, Research Objective 2, and Research Objective 3, respectively (Table 2.1). As follows:

i. **Research Objective 1 -** To explore the challenges in the quality management of China's real estate landscape projects.

   By reading the literature related to the development of quality management in China's real estate industry, four challenges in the development of quality management in China's real estate industry were explored, namely:

Table 2. 1: Four quality management challenges of Chinese real estate landscape projects

CHALLENGES	DESCRIPTION	INTERVIEW THEME
Challenge 1	Lack of mature theoretical support	Interview Theme 1
Challenge 2	Shortage of Quality Management Knowledge	Interview Theme 2
Challenge 3	Excessive Intervention by the Design Department in Project Management	Interview Theme 3
Challenge 4	The difficulty of promoting information system management	Interview Theme 4

Each Challenge corresponds to each Interview Theme. For example, Challenge 1 corresponds to Theme 1 of the Interview. The primary research method to achieve RO1 and validation of the conclusion of the Literature Review was through Interview Theme1, Theme2, Theme3, and Theme4.

ii. **Research Objective 2** - To explore the challenges in the quality management of China's real estate landscape projects.

By reading the literature related to China's real estate landscape projects and China‘s real estate landscape project quality management, this study summarized two factors affecting China's real estate landscape quality management (Table 2.2).

Table 2. 2: Two influencing factors of quality management for China’s real estate landscape projects

Factor 1	The factor of poor quality management in landscape project planning	Interview Theme 5
Factor 2	Customer Demands	Interview Theme 6 & Survey

The realization of RO2 was mainly to verify the conclusion of the literature review of Factor 1 through interview Theme 6. Interview Theme 7 and Questionnaire Survey were mainly to verify and collect relevant information and data of Factor 2 Customer Demands.

iii. **Research Objective 3** - To explore the challenges in the quality management of China's real estate landscape projects.

By reading literature about quality management tools related to real estate landscape projects in China, the Checklist Tool is a current standard

management tool used by real estate landscape practitioners in China, which was verified and achieved Research Objective 3 by Interview Theme 7.

Table 2. 3: Research methods & Interview themes settings corresponding to literature review & RO

Research Objectives	Literature Review	Conclusion	Validation Methods &
Quality Management Challenge (RO1)	Challenge 1	Lack of mature theoretical support	**Interview Theme 1**
	Challenge 2	Shortage of Quality Management Knowledge	**Interview Theme 2**
	Challenge 3	Excessive Intervention by the Design Department in Project Management	**Interview Theme 3**
	Challenge 4	The difficulty of promoting information system management	**Interview Theme 4**
Influencing factors of Quality Management (RO2)	Factor 1	The factor of Poor-Quality Management in Landscape Project Planning	**Interview Theme 5**
	Factor 2	The factor of Quality Management in Satisfying Customer Demands	**Interview Theme 6 & Questionnaires Survey**
Landscape Quality Management Tool (RO3)	Tool	Task statement/design specification as a checklist quality management tool	**Interview Theme 7**

2.8.2 Conceptual Framework

This study follows the basic steps of finding problems, analyzing problems, and solving problems, starting from the development problems of China's real estate industry and the quality management problems of real estate projects so that the root causes of these problems can be gradually determined. And then, this study analyzes these root causes based on the theories of China's real estate industry, China's real estate landscape projects, quality management, and quality management evaluation tools. Finally, this study solves these problems through literature review, interview, and questionnaire survey to achieve the research aim of this study, which can help promote the

development of the quality management of China's real estate landscape project. Therefore, the conceptual framework of this study is as shown in Figure 2.8.

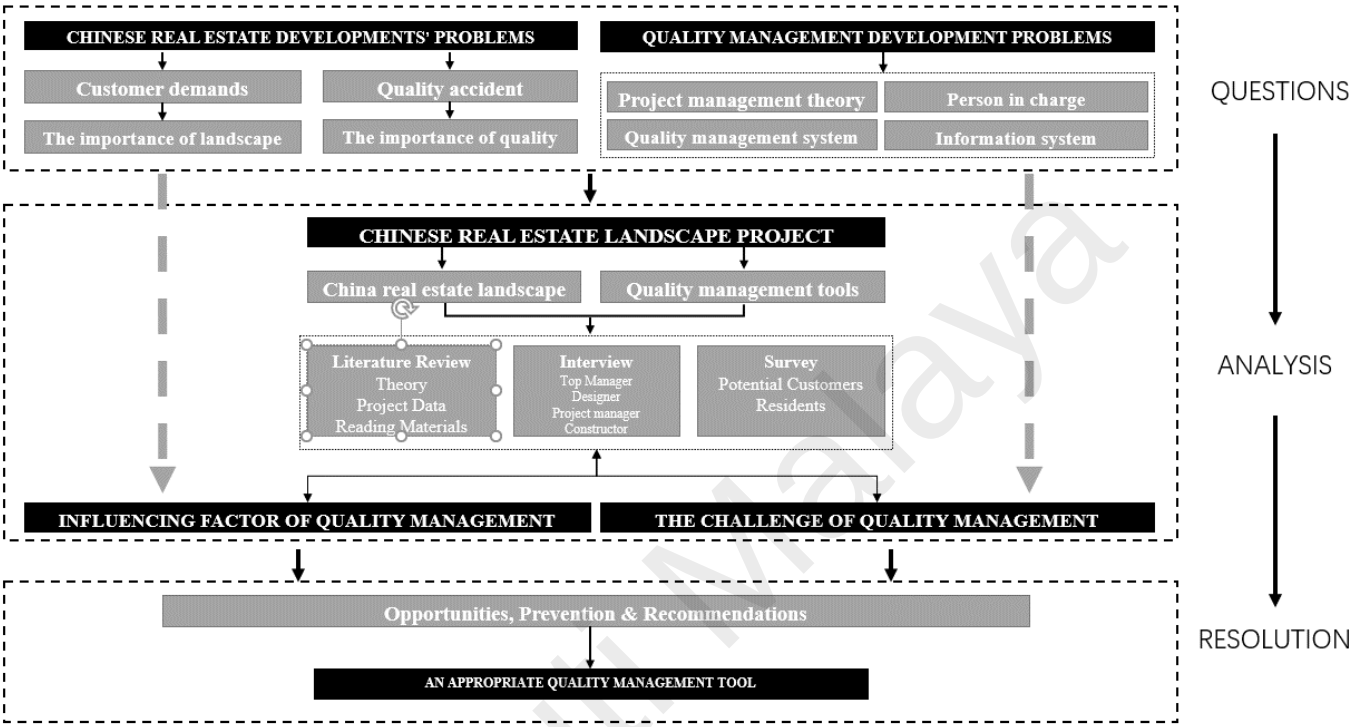


Figure 2. 8: Conceptual Framework of This Study

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter mainly describes the research methods of this study so that it gives detailed instructions for research. This chapter described the Research Design, Research Approach, Research Strategy, Research Techniques, Data Collection, Ethical considerations, and Research limitations of this study, which helped this study answer the research questions and achieve the research objectives and research aim.

3.2 Research Design

The choice of research design depends mainly on the type and aim of a study (McCombes, 2020). This study aims to provide some appropriate suggestions for quality management and a quality management tool for Chinese real estate project practitioners to improve the quality of Chinese real estate projects or products and the real estate landscape industry quality standards. The research adopted the in-depth interview method to collect the views and suggestions of the main stakeholders, senior managers, designers, project managers, and construction personnel participating in the real estate project on the quality management of the real estate landscape project. At the same time, it uses the questionnaire method to collect the data of the satisfaction and demand of customers and potential customers on the landscape quality of the real estate project. Therefore, the descriptive research design is the most appropriate design for this study.

Descriptive research was used to obtain information about the phenomenon's current state, producing rich data and putting forward essential suggestions in practice (McCombes, 2020). And descriptive research design helps answer who, what, when, where, and how related to specific research questions (Siedlecki, 2020). Moreover,

these rich data produced by descriptive research can help identify problems, analyze problems, and put forward essential suggestions (Ayush, 2021). Therefore, this study can achieve three research purposes through descriptive research design on the interview and questionnaire data results, identify the existing quality management challenges of the Chinese real estate landscape, find the influencing factors of quality management, and propose a suitable quality management tool, respectively.

3.2 Research Approach

The mixed methods research approaches were adopted in this study to ensure the depth of the study. Qualitative data based on description and image directly express the quality of landscape projects and the relevant practitioners' consideration for the quality management of landscape projects. Quantitative research focuses on collecting customers' expectations for the quality of landscape projects. This study collected stakeholders' data from different perspectives on the quality management of China real estate landscape projects through the mixed research approach, which can ensure the comprehensiveness of the data in this study and accurately elaborate the control points of quality management of real estate landscape projects in China.

The reason for choosing the mixed approaches is that it helps this study solve the research question and achieve the research objectives (Miles & Huberman,1994). For example, to collect data from the relevant important stakeholders of China's real estate landscape projects to explain the actual project quality problems; to collect the data about the current situation and the expectation of quality management; to reveal the disadvantages of the current Chinese real estate landscape quality management; to find the current opportunities and suggestion for quality management; and then, to propose improved suggestions for the quality management tool for China real estate landscape project practitioners. (Table 3.1).

Table 3. 1: Comparison of Qualitative & Quantitative research method（Miles & Huberman,1994）

Qualitative Research Literature Review & Interview	**Quantitative Research** Survey Questionnaire A & B
The purpose of the study is a complete and detailed description.	Its purpose is to classify, count and rank the characteristics of the research object, and construct a statistical model to try to explain the observed content.
Before the investigation, researchers generally know the research direction.	Before the investigation, researchers know the research direction.
It was recommended in the early stages of the research project.	It is recommended for later stages of the research project.
With the development of research	All aspects of the study were carefully designed before data were collected.
Researchers are data collection “tools” which get data information by watching, reading, and talking.	Researchers use tools such as questionnaires or equipment to collect digital data.
The data are presented in text, pictures, or objects.	The data are presented in the form of figures and statistics.
Qualitative research is subjective; individual interpretation of events is essential, such as participant observation, in-depth interviews, etc.	Seeking accurate measurement and analysis of the concept of goal, for example, using surveys, questionnaires, etc.
Qualitative data is more "ample," time-consuming, and less generalizable.	Quantitative data are more effective and can test assumptions but may miss contextual details.
Researchers and interviewers tend to immerse themselves subjectively in the topic.	Researchers tend to remain objectively separate from the subject.

3.4 Research Strategy

Research Strategies help answer research questions and achieve research objectives (Siedlecki, 2020). Generally, the typical research strategies include case study, qualitative survey, qualitative interview, and action research or action-oriented research (Bhandari, 2020). These research strategies are not suitable for all research. Different types of research strategies have proper research and have their own advantages. Therefore, researchers should carefully choose research strategies (Bhandari, 2020) to

answer research questions effectively. Thattamparambil (2020) stated that the determination of research strategies used in the study should be guided by the research methods used in the study. Therefore, in order to select the most appropriate research strategy and method for this study, we should refer to the research questions of this study.

i. **Research Question 1** - What are the quality management problems of Chinese real estate landscape projects encountered?

ii. **Research Question 2** - What are the key points of quality management concerned by different stakeholders of Chinese real estate landscape projects?

iii. **Research Question 3** - How to improve the quality management tools of China's real estate landscape projects?

Table 3. 2: Research Questions, Objectives, and Methods

Research Question	Research Objective	Method
RQ1 What are the quality management problems of Chinese real estate landscape projects encountered?	RO1 To explore the challenges in the quality management of China's real estate landscape projects.	• Literature Review • Interview
RQ2 What are the key points of quality management concerned by different stakeholders of Chinese real estate landscape projects?	RO2 To identify the factor influences of the quality management of China's real estate landscape projects.	• Literature Review • Interview • Survey
RQ3 How to improve the quality management tools of China's real estate landscape projects?	RO3 To provide suggestions to improve the existing quality management evaluation tool for Chinese real estate landscape projects.	• Literature Review • Interview

The above table showed that this study involved primary and secondary data. Questionnaires and interviews mainly collect the primary data. Through questionnaires

survey, potential buyers and residents are surveyed. The interviewees are the essential employees who affect the quality of landscape projects, such as the design director, designer, project manager, and constructor of A landscape project of Country Garden Group. The primary method of collecting secondary data is to search the quality management theory of real estate landscape projects domestically and abroad through the literature review. Therefore, the research methods used in this study are qualitative research and quantitative research. The ultimate goal of this study is to achieve research objectives. Thus, this study starts from solving research problems. The data is collected from different research methods, analyzed, and finally obtained the study results.

From the above tables and descriptions, it can be seen that the more suitable research strategies for this study are Qualitative Interviews and Qualitative Questionnaires.

i. Qualitative Interview

As the most commonly used method for researchers to collect data, the interview process helps researchers collect rich information (Nikita, 2020) through the interviewee's answers, which means that interviewee selection is crucial because they need to have rich experience and knowledge to testify their statements. However, the qualitative data is still highly subjective, which may bring problems and biases to the research (Shah, 2019). Therefore, it is necessary to avoid the guidance and other problems as much as possible from starting with the interview design stage of this study.

ii. Quantitative Survey

It is usually easier to obtain a large number of participants from a survey, and the question design of the questionnaire needs to be of research significance (Bhandari, 2021). The questionnaire needs to be combined with research questions to help obtain reliable data results to achieve the research purpose. When using the

questionnaire, it is necessary to determine the size of the sample and whether and when the sample represents the entire population studied (Pritha, 2021). Therefore, this study's questionnaire sample and design need to be representative, accurate, and rational.

In short, consistent with this study's objectives, this study aims to put forward suggestions on China's real estate landscape quality management and a quality management tool, which help to minimize the quality problems of China's real estate landscape projects. This study needs to take the secondary data and survey results obtained from the critical review of relevant literature as the primary data and finally draw a reliable conclusion. Therefore, this study chose to conduct this study by using the qualitative approach via Qualitative Interview Strategy and the qualitative approach via Quantitative Survey Strategy.

3.5 Research Techniques

This section mainly describes the interview technique and questionnaire survey technique, relevant question design, sample selection and calculation, data transcription and coding, interview guidance and survey process, and similar research.

3.5.1 Interview Technique & Size

3.5.1.1 Interview Method

The interview method collects qualitative data to specific objects to summarize and analyze critical information, and interviews may be unstructured, semi-structured, or structured (Marshall and Rossman, 2011). Interviews can investigate questions in a smaller scope and deeper (Merriam & Tisdell, 2016). The interview method of this study focuses on verifying the data obtained from the literature review. The opinions and suggestions of experienced Chinese real estate landscape practitioners on quality

management were investigated. The semi-structured interview method was adopted, and the interview questions were not guided; the experts were encouraged to share more experience.

3.5.1.2 Interview Design & Contributions

Table 3. 3: Code information of the interview

Part	Interview Theme	Topic	Theme Code	Questions Code	No. of Questions
Part B Quality Management Challenge	**Interview** Theme 1	Challenge 1. Lack of mature theoretical support	**QMC1**	C1 – C3	3
	Interview Theme 2	Challenge 2. Shortage of Quality Management Knowledge	**QMC2**	C4 – C6	3
	Interview Theme 3	Challenge 3. Excessive Intervention by the Design Department in Project Management	**QMC3**	C7 - C9	3
	Interview Theme 4	Challenge 4. The difficulty of promoting information system management	**QMC4**	C10 – C15	6
Part C Influencing factors of Quality Management	**Interview** Theme 5	Factor 1. The factor of Poor-Quality Management in Landscape Project Planning	**IF1**	C16 – C21	6
	Interview Theme 6	Factor 2. The factor of Quality Management in Satisfying Customer Demands	**IF2**	C22 – C29	8
Part D Landscape Quality Management Tool	**Interview** Theme 7	Task statement/design specification as a checklist quality management tool	**QMT**	C30 – C40	10
					Total: 40

The interview was divided into four parts, with seven themes and a total of forty questions (Table 3.3) (Appendix C).

i. **Part A -** Collecting the basic information of the interviewee

ii. **Part B** - Discussing the four challenges of quality management in China's real

estate landscape projects mentioned in Chapter two literature review, which can

- Answering Research Question 1 -What are the quality management problems of Chinese real estate landscape projects encountered?

- Validating: The four challenges of the development of China's Real estate landscape projects quality management were concluded in Chapter 2 Literature Review.

- Achieving Research Objective 1 - To explore the challenges in the quality management of China's real estate landscape projects.

Table 3. 4: The Function of Interview Part B Question Design

RESEARCH QUESTION & OBJECTIVES	VALIDATION	INTERVIEW THEME
Research Question 1 What are the quality management problems of Chinese real estate landscape projects encountered **Research Objective 1** To explore the challenges in the quality management of China's real estate landscape projects.	Challenge 1. Lack of mature theoretical support	Theme 1
	Challenge 2. Shortage of Quality Management Knowledge	Theme 2
	Challenge 3. Excessive Intervention by the Design Department in Project Management	Theme 3
	Challenge 4. The Difficulty of promoting information system management	Theme 4

iii. **Part C** - Verifying the two factors that have been identified in Chapter one and Chapter two that affect China's real estate landscape quality management, which answers research question two.

- Answering Research Question 2 - What are the key points of quality management concerns different stakeholders of Chinese real estate landscape projects?

- Validating: The two influencing factors of China's real estate landscape projects quality management were concluded in Chapter 2, Literature Review.

- Achieving Research Objective 2 - To identify the influencing factors of the quality management of China's real estate landscape projects.

Table 3. 5: The Function of Interview Part C Question Design

RESEARCH QUESTION & OBJECTIVES	VALIDATION OF LITERATURE REVIEW	INTERVIEW THEME
Research Question 1 What are the key points of quality management concern different stakeholders of Chinese real estate landscape projects? **Research Objective 2** To identify the influencing factors of the quality management of China's real estate landscape projects.	Factor 1. The Poor-Quality Management in Landscape Project Planning	Theme 5
	Factor 2. Quality Management in Satisfying Customer Demands * The finding of Theme 6 also provided the basis for designing questionnaires A and B.	Theme 6

iv. Part D - To understand the advantages and disadvantages of task statement/ design specification (checklist tool) in China's real estate landscape quality management. Then, improvement suggestions combined with other research results answer the three research questions. And Pard D Related to Interview Theme 7.

3.5.1.3 Interview Process

Due to Covid-19, the interview of this study was conducted online. The interviewees were first confirmed with their schedule, and then they were informed of the research background, research objectives, purpose of the interview, and interview questions

were distributed. The interviewees have answered all 40 questions, and data were collected.

3.5.1.4 Selection of Sample for Interviewee

3.5.1.4.1 Population Definition

As the scope of this study is the landscape project of China's real estate, real estate project-related practitioners, potential customers, and residents are the target group of this study.

A successful real estate project cannot be achieved without the developer's positioning and research, the senior management's decision, the designer's drawings, the constructor's construction skills, the project manager and other functional managers' management skills, and the value of products granted by customers (Xu, 2019). Therefore, different stakeholders in the real estate landscape project process have different understanding and needs for the project, which usually causes conflicts among stakeholders and thus leads to quality problems of the project (Ge, 2021). It can be seen that each stakeholder's perspective is an essential guide to the success of the project, but According to the previous scholars' research on quality management of real estate landscape projects, most of the research was from a single design perspective. Few research studies studied quality management from project managers, designers, constructors, and customers. As mentioned above also means that in China's real estate landscape project, the designer has a higher degree of intervention in project management than other stakeholders, which usually happens in a scene where the designer sits in the office to decide and guide the on-site construction how to construction, which led to the quality problems of the project. That is, the Challenge 3 (*Excessive Intervention by the Design Department in Project Management*) of the quality management explored in Chapter two.

Thus, this study collected data from different stakeholders of China's real estate landscape projects to make up for the research gap of these similar research and ensure more comprehensive and diversified data. To find the balance point of quality management between different stakeholders as far as possible, so as to help this study put forward more accurate improvement suggestions for the quality management and the quality management tool of China's real estate landscape projects and practitioners.

3.5.1.4.2 Target Population

Country Garden Group was China's largest and most mature new urbanization residential developer. The considerable number and volume of projects of Country Garden Group make the organization have a significant reputation and influence in China. Country Garden Group adopted a centralized and standardized operation mode to develop its main business of real estate development, property development, construction and installation, decoration, maintenance management, property investment, hotel development and management, modern agriculture, and the robot industry (Country Garden Group, 2021).

Country Garden Group provided diversified products for most cities of China and Overseas to meet the needs of different markets. During the 20 years since the establishment of Country Garden Group, it has created much value, which prepared 2662 real estate projects to provide a high-quality residential living environment for 4.5 million owners in China. At the same time, it has developed real estate projects in more than 1200 cities and towns, which achieved complete coverage in 31 provinces of 34 in the mainland of China, becoming the most widely distributed developer in China's real estate industry (Country Garden Group, 2021). The cities where Country Garden Group's projects were located have directly and indirectly created more than 2 million job opportunities for China (Country Garden Group, 2021), and their total tax payment

in 2020 is 65.3 billion yuan (Country Garden Group, 2021), which has vital support for China's economy.

Generally, internationally, the Fortune Global 500 list published once a year was regarded as the most famous and authoritative list to measure the world's large companies. The list ranks the world's large companies based on enterprise operating annual revenue. In 2017, Country Garden Group was ranked 467th of Fortune Global 500 for the first time (Country Garden Group, 2021). In 2019, it ranked 177th on the list with a sales amount of 771.5 billion RMB. In 2020, Country Garden Group was Ranked147th that became the world's first real estate enterprise with operating revenue of US $70.335 billion. In 2021, country garden ranked 139 with operating revenue of US $67.08 billion (Fortune, 2021).

It can be seen that the real estate sales, research results, products, and organization development trend of Country Garden Group can affect the economy of major cities in China and the development of major industries, especially China’s real estate industry. Therefore, Country Garden Group is qualified to represent China's real estate industry to elaborate and explain certain research phenomena, which is also the reason why this study chose it as the target company. In addition, as the ranked number one real estate developer in China, Country Garden Group has complex recruitment requirements and processes in recruitment, which has rigorous requirements on employees' background (family background, education, and significance), logical ability, interpersonal communication ability, professional ability, and management ability. The annual talent training plan and layoff plan also make all of the practitioners of Country Garden Group strive to continuously break through their working ability in their posts with highly competitive pressure.

To sum up, and according to the functional division of the Landscape Design Center of Country Garden Group, it can be summarized that the main stakeholders involved in the construction of the real estate landscape project can be roughly summarized as Project Planners (Business Planning, Investment Sector, Land Acquisition Sector, and Top leadership), Designers (Landscape Designers, Draftsmen, and Landscape Design Management), Middle Management (Project Manager and Other Functional Managers), Construction Sector (Construction Management and Constructors) and Maintenance Management (Country Garden Group, 2021). Since the research scope of this study is mainly landscape quality management, the maintenance personnel should not be considered as the interview object of this study.

Therefore, this study selected the employees of the Landscape Design Center Of Country Garden Group headquarters as the target group of this interview to collect different views and statements from different stakeholders so as to ensure this study can collect the comprehensiveness and balance of interview data.

3.5.1.4.3 Sampling Technique & Size

Cohen, Manuin & Morrison (2007) stated that Purposive Sampling was usually used to contact experts in a particular field. Furthermore, the interview process of this study was to answer three research questions about China's real estate landscape project, verify the data obtained from the literature review, provide the basis for questionnaire design, and realize three research objectives. Therefore, according to the description of the previous section, the subjects of this study were landscape project experts and intellectuals from the Landscape Design Center of Country Garden Group.

3.5.1.4.4 Selection Criteria

In order to ensure that interviewees can deeply understand the interview questions and give professional answers according to their professional knowledge and actual landscape projects experience, this study sets strict selection criteria when selecting interviewees to ensure the effectiveness and availability of data.

Table 3. 6: Selection Criteria for Interviewees

CRITERIA		CONDITION	MEANING DESCRIPTION
DEGREE		Bachelor degree & above	High level of Education
MAJOR		Architecture, Landscape Architecture, and urban planning	Rich professional knowledge of landscape
YEARS OF WORKING SERVICE		3 Years & Above	Have good working ability (not laid off or optimized by Organization) and recognize the organizational culture
NUMBER OF PROJECTS INVOLVED	Total number	50 Projects & Above	Rich experience in practical landscape projects
	Independently completed projects	10 Projects & Above	Independent project management experience and insights
	Number of excellent projects	5 Projects & Above	Participate in projects with high--level quality requirements
WORKING PERFORMANCE	Appraising	Personal Performance Ranking in the top three of each team	capable worker
	Award	Won the landscape project award	High-quality experience in practical projects
	Team Performance	Medal of excellence Team	cooperation ability and good at communication

3.5.1.4.5 Sample Size

The qualitative interview sample size's general definition and the accepted standard was saturation (Guest & Macqueen, 2008). Once the saturation was achieved in the previous interviews, the subsequent interviews can only produce negligible data or can not continue to continue to produce new qualitative data. Because qualitative data was different from quantitative data that can calculate the sample size, scholars usually determine the sample size of qualitative interviews by their experience.

However, Morgan (2002) decided to break the empirical rule of interview samples to pilot the number of new information identified in successful interviews across four datasets, and after 20 interviews, almost no new concepts were found. According to the research data of Morgan (2002) demonstrated that the first five to six in-depth interviews produced the newest data, and about 80% to 92% of the information was determined in the first ten interviews.

Subsequently, Guest, Bunce & Johnson (2006) systematically summarized and analyzed the data of 60 in-depth interviews conducted by interviewers in their studies. The results showed that 6-12 interviews were the best choice for the number of qualitative interviews needed to reach saturation (Figure 3.1). Namey (2019) agreed with this conclusion and said, “For interviews, to do them well, choose a sample from 6-12”. Thus, the interview sample size of this study was set at the median number in the qualitative interviews sample size range of 6-12 mentioned by the previous research, which was nine interviewees.

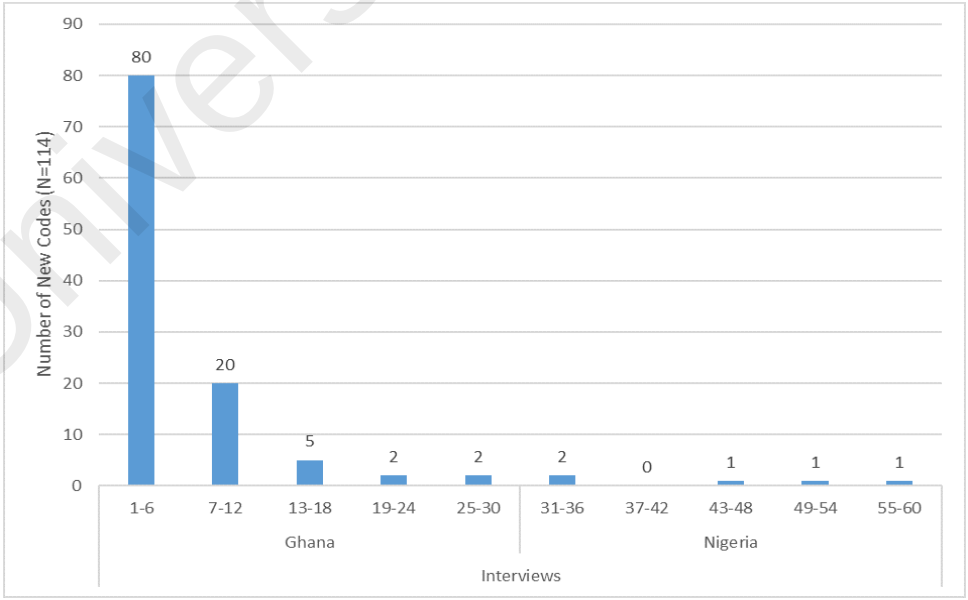


Figure 3. 1: Number of new information produced by 60 in-depth interviews (Guest, Bunce & Johnson, 2006)

3.5.1.4.6 Identification of Interviewees

In order to ensure that this study can obtain more comprehensive data and more average viewpoints, this study determined the specific nine interviewees according to the population information mentioned in the above section, the functional structure of the real estate landscape project stakeholder, the interview target company, target population, the selection criteria and sample size of the interviewees. At the same time, the interview questions were mainly aimed at the quality management objectives and quality management problems of the main workflow in the China real estate landscape project of Country Garden Group, and purposefully verified the content of the literature review to solve the three research questions, then achieved the three research objectives of this study. Thus, to obtain more accurate and rich interview data, the interviewees of this study were two Top Managers, two Landscape Designers, two Project Managers, and Three Construction Management staff (Draftsman, Construction Manager, and Constructor) from the Landscape Design Centre of Country Garden Group.

Table 3. 7: List of Interviewees

No	Name	Qualification	Units	Working Experiences	No. of Projects (Above)
1	Du Doris	Deputy Chief Engineer	Top Management	16	500
2	Zhang Miao Bing	Principal Engineer		21	610
3	Hu Meng Meng	Senior Engineer	Design	7	230
4	He Jian Ming	Assistant Engineer		4	115
5	Li Hong	Assistant Engineer	Design Management	4	190
6	Mao Yu Qing	Senior Engineer		7	331
7	Zhang Yi Fan	Engineer	Construction	5	63
8	Zhong Qu Yin	Senior Engineer		6	50
9	Huang Zhi Cheng	Assistant Engineer		5	55

3.5.2 Questionnaire Survey Technique & Size

The purpose of the questionnaire survey in this study was to investigate the customers' satisfaction with the landscape quality of the current residential area and the buyers' expectation of the landscape quality of the ideal residential area. At the same time, Questionnaires correspond to the interview Theme 6, further studying Factor 2. Customer Demands of the influencing factors affecting China's real estate landscape quality management. Therefore, the questionnaire of this study was divided into Questionnaire A and Questionnaire B. The respondents of Questionnaire A were the residents of Phase I of Project A Country Garden Group, and the respondents of Questionnaire B were the buyers of Phase II of Project A of Country Garden Group.

3.5.2.1 Questionnaire Design

The two questionnaires design of this study were based on the project data, the results of Theme 6 of the interview of this study, and the research conclusions of similar scholars.

3.5.2.1.1 References of Project Design Data

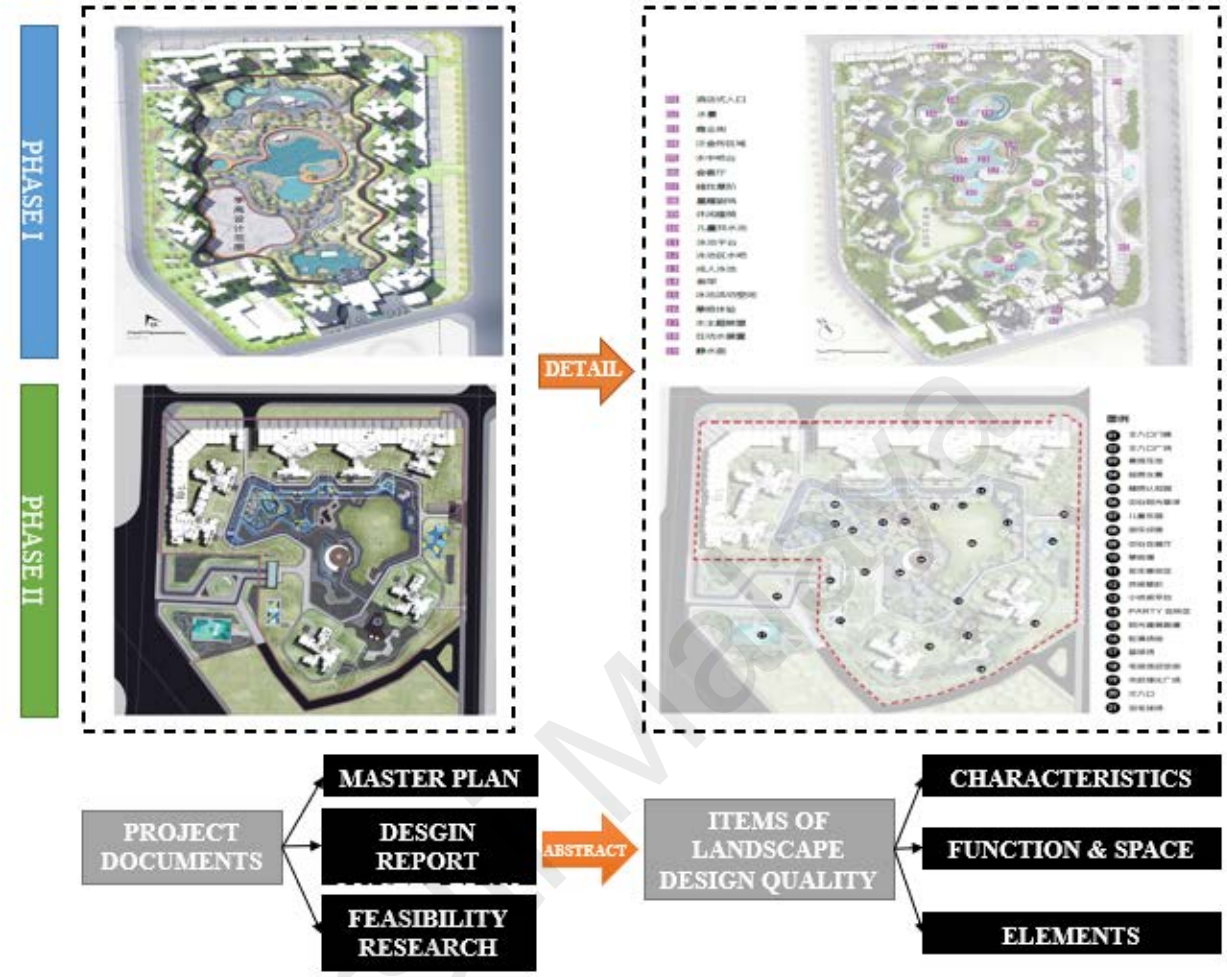


Figure 3. 2: Contribution of project data to questionnaire design

Due to the target respondents of the questionnaire A and B were residents and potential customers of project A respectively, therefore the design elements and design concepts contained in the landscape design document of the A project were given priority in the questionnaire (Figure 3.2).

3.5.2.1.2 References of Date of Interview Theme 6

Theme 7 of the interview was to verify the statement that customer demand has a significant impact on China's real estate landscape quality management. The interview

data demonstrated the importance of customer demand, the leading causes of customer complaints, and the research direction of customer demand. The results of C25 Table 4.19 and C26 Table 4.20 show that landscape design quality has a more significant impact on customer needs. Therefore, this research questionnaire focuses on the quality of landscape design.

Table 4.21 of C27 shows the interviewees' customer research suggestions, which were rank 1 Landscape characteristics, rank 2 Landscape function and space, rank 3 Landscape elements, and rank 4 Landscape engineering. C7's result was consistent with Liu (2019) "*The quality of a real estate landscape project is evaluated from four aspects: landscape design, landscape engineering, landscape characteristics, and maintenance management, which contain the whole life cycle of the landscape project.*" However, since maintenance management is out of the research scope of this study, the questionnaire section of this study should be divided into landscape characteristics, landscape design, and landscape engineering （Theme 7 C27） (Liu, 2019).

Table 3. 8: Word Frequency Count

ITEMS	KEY WORDS	INTERVIEW QUESTIONS	FRENQUENCY
Pavement System	Pavement Material	C2 C6 C8 C9 C19 C20 C25	12
Green System	Green, Plant, Grass, Green Cover	C1 C2 C8 C16 C20 C21 C22	11
Artistry	Beautiful, Artistry	C16 C18 C22 C25	4
Creativity	Homogenization, Difference, Same Style	C17 C18 C19 C25	4
Ecology		C16 C25 C29	3
Comfort		C9 C16 C25	3
Move Space	Sport's Needs, Fitness, Court	C24 C27	3
Sense Of Quality		C16 C26	2
Safety & Health	Safety Health	C8 C16	2
Outdoor & Platform		C24 C26 C27	3
Pet	Pet Dog	C24 C27	2
Hommization		C23 C25	2
Communication	Society	C16	1
Sculpture		C2	1
Landscape Space		C2	1
Leisure Area		C26	1
Road		C26	1
Function Lawn	Tamped Grass	C27	1
Children Playground	Children And Parents	C27	1

Nine interviewees mentioned the statements related to landscape design quality among the 40 interview questions in the interview, the related word frequency statistics as Table 3.8. therefore, these items need to be included in the questionnaire.

3.5.2.1.3 References of Similar Research Results

Table 3. 9: Residents' satisfaction with similar research questionnaires

No.	Author	Years	Dimension of de questionnaire based on Landscape Aspects
1	Liu	1999	• Management and maintenance of the estate • Lighting and ventilation • Convenience

			• Appearance of building • Surroundings • Spatial movement • Fire service installation • Appropriateness of site including privacy • Building materials used
2	Phillips et al.	2005	• Interior environment • Exterior environment • Security concerns
3	Kearney	2006	• Sense of community. • Satisfaction with public landscape space. • Satisfaction with nearby nature.
4	Kellekci & Berkoz	2006	• Satisfaction with recreational areas • Satisfaction with centrality • Satisfaction with social structure and physical structure • Features of settlement • Satisfaction with transportation and accessibility • Satisfaction with social facilities
5	Adriaanse	2007	• Internal neighborhood reputation • Social climate • Dwelling satisfaction
6	Xiao, Jian, Fei & Hokao	2007	• Convenience with living facilities • Convenience with access to working and studying • Convenience with access to nearby cities • Amenity with natural living • Amenity with environment • Amenity with landscape • Safety • Healthy; (with sanitary conditions, health with no pollution) • Comfort. • Community • Services
7	Leslie & Cerin	2008	• Safety and walkability • Access to destinations • Social network • travel network
8	Muhammad et al.	2010	• Housing characteristics • Public infrastructure • Neighborhood characteristics • Transportation and communication services • Solid waste disposal service • Environmental protection • Public health service • Safety
9	Rioux & Werner	2011	• Local area satisfaction. • Satisfaction with access to services in the local area. • Satisfaction with relationships with neighbors • Home satisfaction
10	Ibem & Amole	2013	• Location • Management of housing estates. • Services. • Environment characteristics. • Lighting, ventilation • Facilities. • Safety and security of residence • Privacy • Comfort

11	Mridha	2015	• Management and maintenance. • Architectural features. • Landscape value • Recreational facilities. • Ambient environment
12	Huang & Du	2015	• Environment characteristics. • Public facilities. • Landscape space
13	Afacan	2015	• Physical dimension • Interaction with other residents of the neighborhood • Feeling a sense of belonging • Comfort • Maintenance dimension
14	Xue, Mak & Ai	2016	• Air quality and thermal comfort • Luminous comfort • Acoustic comfort
15	Hadavi & Kaplan	2016	• Green features • Public space • Comfort
16	Ibem et al.,	2017	• Services and infrastructure • Socioeconomic environment • Security • Noise • Privacy

Table 3.9 showed the dimensions (items) of the landscape in the questionnaire survey of residential customer satisfaction research by other 16 researchers. Among them, the most frequent keywords in landscape characteristics were Convention and Health & Safety, consistent with Theme 7 IF2 customer demands. Therefore, convinces and Health & Safety should be regarded as crucial evaluation factors of landscape characteristics.

3.5.2.2 Questionnaire A & B Design Results

The questionnaire design is based on the primary data of A project, the finding and discussion interview Theme 6, previous similar research (residential customer satisfaction topic), and literature review. Theme 6's findings determined the classification basis of the questionnaire's four sections. Project design documents and similar studies determined the terms of the landscape function and space, landscape

elements, and some landscape characteristics of the questionnaire. Therefore, the four sections of the questionnaire were divided as Figure 3.3 based on the above findings.

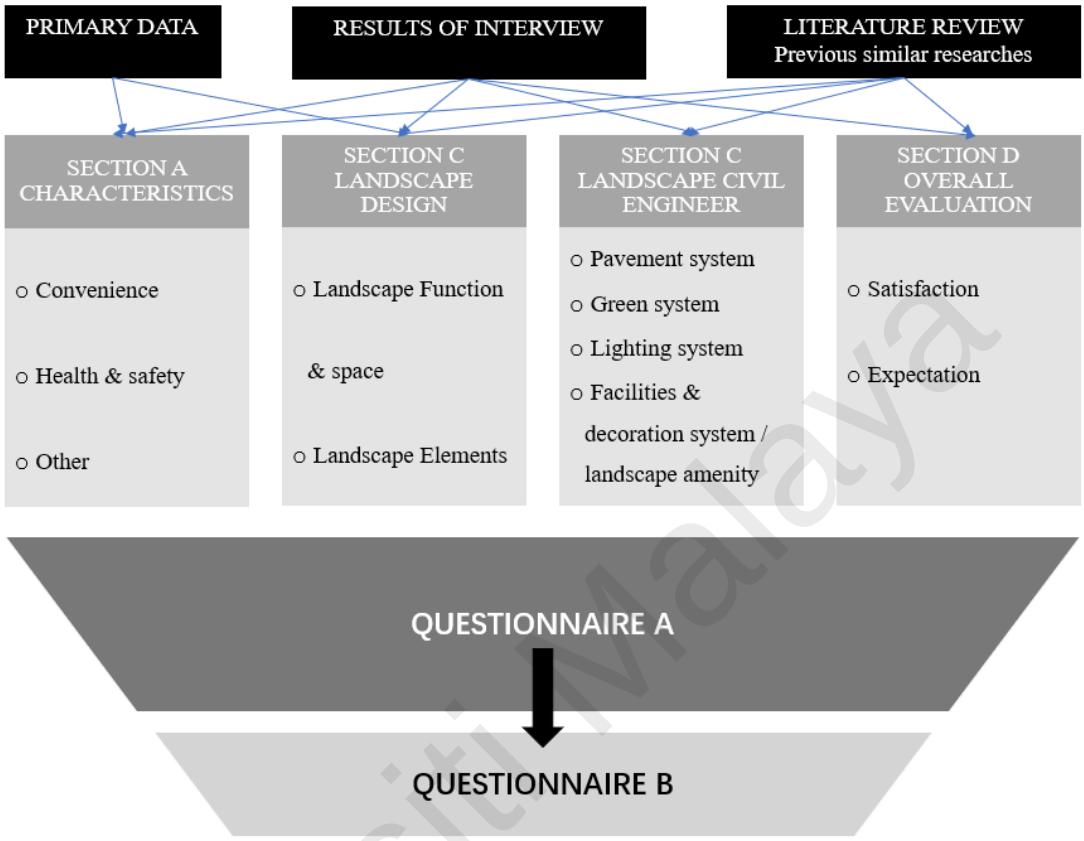


Figure 3. 3: Questionnaire Design Basis

According to the similar research of six Chinese researchers in Table 3.10 mentioned below, questionnaire A was consistent with using the five-point scoring method to request the residents of A project phase I evaluate the landscape quality satisfaction of A project phase I. Furthermore, Questionnaire B was to investigate the demands of potential buyers, so the form was changed to multiple choices, but the others correspond to questionnaire A (Refer to Appendix A & Appendix B).

3.5.2.3 Slecetion of Sampling for Quesionnaires

A questionnaire survey can help this study obtain the primary data of customers' attitudes towards real estate landscape quality and requirements.

3.5.2.3.1 Target Population

The real estate project is ultimately to achieve its commercial value, and commercial value depends on the purchasing power of customers. The market orientation of real estate projects must be based on customers' needs. In other words, although these customers are not professionals of landscape projects and project management, they are the ultimate services target group of Chinese real estate projects. Moreover, customers pay more attention to landscape projects, so customers' demands on landscape quality are critical. Therefore, the respondents of this study are Country Garden Group's customers and potential customers. The question of the questionnaire involves the quality expectation of landscape project components. Finally, through the quantitative analysis of the questionnaire data, to achieve the scientificity and objectivity of this study. Therefore, their questionnaire can output to this study where the customer is concerned about the quality of the landscape project.

3.5.2.3.2 Sampling Technique & Sample Size

In this study, the random sampling method is used. The questionnaire survey is distributed to potential customers and residents, mainly asking about the satisfaction degree and expectations about landscape project quality.

The first step to determine the sample size is to define the target population size, and the second step is to bring the target population size into the calculation formula to decide the number of questionnaires.

3.5.2.3.3 Population Size

As mentioned above, in this study, the first step to determine the sample size is to define the target population size, and the second step is to bring the target population size into the calculation formula to decide the number of questionnaires.

China's real estate projects divide projects into different grades to meet different customers. Country Garden Group divides its real estate landscape projects into four grades in terms of the quality grade: U, V, X, Y, Z. The U is the highest standard project in all aspects. That is to say. All stakeholders usually pay the most attention to landscape quality management in U-type projects. Because U-type project attracts wealthy customers, these customers prioritize the quality of landscape projects when buying a house. The project manager must ensure the quality of landscape projects with the help of various resources and forces in the process of U type project. Therefore, the questionnaire of this study is mainly distributed to the residents of Country Garden Group U Type A project phase I (completed) and the potential customers of A project phase II (constructing). According to the calculation of 1.5 housing units per urban resident in China, the population size can be calculated as follow:

i. $\boldsymbol{N1}$: A Project phase I consists of fifteen buildings and 2326 housing units. The population size of residents is $\boldsymbol{N1.} = \frac{\mathbf{2326}}{\mathbf{1.5}} = \mathbf{1551.}$

ii. $\boldsymbol{N2}$: A Project phase II consists of six buildings and 874 housing units. There are 583 potential customers set in this study, which is $\boldsymbol{N2.} = \frac{\mathbf{874}}{\mathbf{1.5}} = \mathbf{583.}$

3.5.2.3.4 Sample Size

The formula process (Figure 3.4) (Kish, 1960) can provide the minimum number of respondents to be obtained.

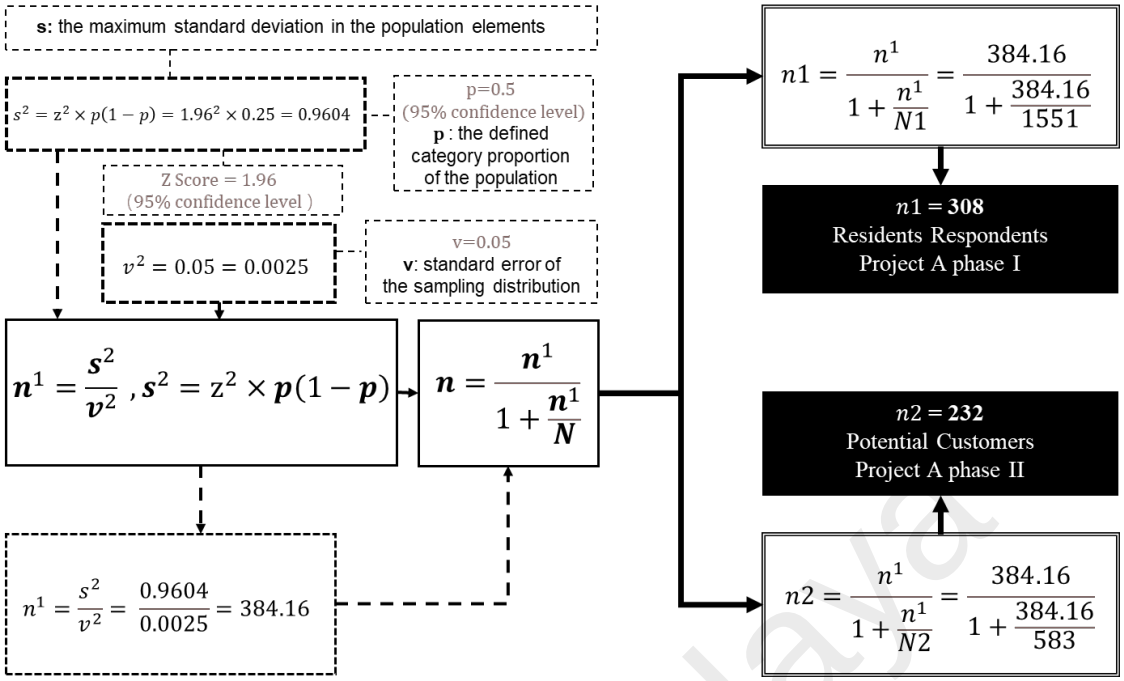


Figure 3. 4: Calculation Process of Sample Size

i. **n** is the sample size of this study:

***n*1** can be regarded as the residents' sample size of A project phase I.

***n*2** can be regarded as the potential customers' sample size of A project phase II.

ii. **N** is the target population size

***N*1** (Residents) =1551.

***N*2** (Potential Customers) =583.

According to Figure 3.1, the sample size (the minimum number of respondents) of this study is $\boldsymbol{n1 = 308}$ and $\boldsymbol{n2 = 232}$, respectively. Therefore, the number of questionnaires for resident responses is 308, the number of questionnaires for potential customers is 232. The total number of questionnaires is 540.

3.5.2.3.5 Acceptability of Questionnaires Sample Based on Similar Research

Table 3.9 summarized the number of questionnaire samples, questionnaire evaluation methods, and the number of items or aspects related to landscape quality of Chinese scholars similar to this research topic.

Table 3. 10: Reviews on response rates of similar research in China Real Estate

No.	Author	Years	Cities / Regions in China	Evaluation Method	Sample	No. of Items/Aspects
1	Liu	1999	Hongkong	Five Point	212	30
2	Phillips et al	2005	Hongkong		518	18
3	Xiao, Jian, Fei & Hokao	2007	Changjiang Delta Region		818	49
4	Huang & Du	2015	Hangzhou		476	12
5	Zhang & Lu	2016	Beijing		184	20
6	Xue, Mak & Ai	2016	Hongkong		482	15
				Average	**448**	**24**
				This Study	**540**	**35**

It can be seen from Table 3.10 that the sample size of residential satisfaction in previous studies and the items investigated are different, but the scoring standard is to evaluate the degree of satisfaction or liking based on the five-point evaluation method. The sample size of previous studies ranges from 184 (Zhang & Lu, 2016) to 818 (Xiao et al., 2007), and the average sample size is 448. Survey Items ranged from 12 (Huang & Du, 2015) to 49 (Xiao et al., 2007), with an average of 24 items. The sample size of this study is 540, and the items related to the residential landscape of this study investigated are 35 items or aspects (including landscape function, landscape space, landscape elements, and landscape engineering in the residential environment). Therefore, this study's survey samples, items, and evaluation methods of demands and satisfaction are acceptable. Moreover, the distribution objects of this study's questionnaire can represent the Great Bay Area of Guangdong, Hong Kong, and Macao in China.

3.6 Data Collection

The qualitative data of this study was mainly composed of Literature Review and the interviewee's answers. The quantitative data of this study was the satisfaction and demand of customers and potential customers on the quality of real estate landscape projects collected through questionnaires.

3.6.1 Qualitative Data Collection

The existing quality management system and tools are summarized through literature review to find the relevant theories suitable for the quality management of real estate landscape projects. Based on these theories, the following data collection methods and plans are used to collect data from 10th October 2021. End with 5th December.2021.

Before the end of this study, the literature review of landscape quality management is still continuously processed to find the latest theories and verify the existing arguments. Based on the latest research results, the applicability of these quality management theories and tools in China's real estate landscape projects can be analyzed. Moreover, based on the latest quality management theories, the interview questions can be timely revised so that the applicability of these theories is verified by asking respondents about their opinions.

The in-depth semi-structured interviews were used to collect data in this study, allowing interviewees to answer interview questions freely and deeply. The most important thing is to get the views of different stakeholders on quality management to ensure the comprehensiveness suggestions of the quality management and quality management tool proposed in this study. Due to the covid-19, in order to facilitate the interviewees, the interview was conducted online. Furthermore, the interview date was from 15th November to 20th December 10, 2021. In order to ensure the comfort and security of the

interviewees, the planned initially face-to-face interview had to be changed to the online interview. The interview questions were sent to the interviewees in advance. Then the interviewees were familiar with 40 interview questions and then had a discussion to ensure that they understood the interview questions adopted in this study. Then they answered the questions in different forms in their way. This study can obtain data from different angles by interviewing nine experts in China's real estate landscape industry. Recording the content in writing during the interview can ensure that these answers can be transformed into quantitative data and verified in the future.

3.6.2 Quantitative Data Collection

Second, a total of 540 questionnaires should be distributed to the targeted population, potential customers, and residents. Three hundred eight questionnaires should be distributed to residents and another 232 to potential customers. The survey was from October 15, 2021, to December 5, 2021. In order to ensure the response rate and the authenticity of the data, the questionnaire was conducted in the form of one-to-one. The closed questionnaire saved the interviewees' time and was convenient for later transformation. The questionnaire survey process was based on the interviewees' willingness.

3.7 Data Analysis

3.7.1 Data Analysis of Interview

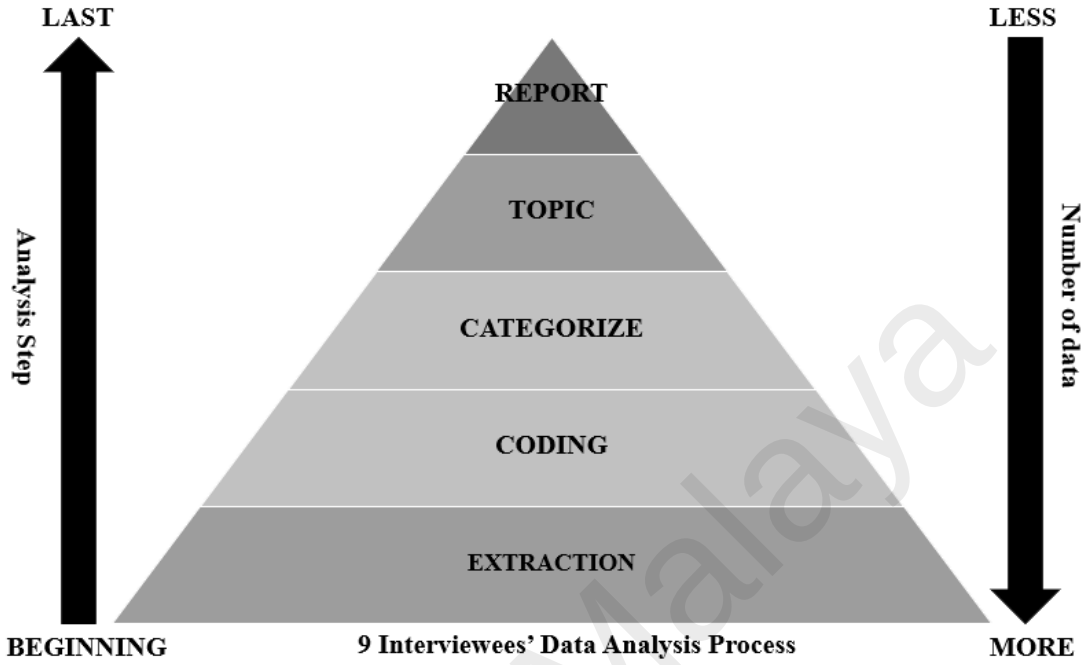


Figure 3. 5: Data analysis process of 9 Interviewees' answers

The interview records and literature review must be classified according to the research questions to obtain this study's results. Combined with Braun & Clarke (2006), this study's qualitative data analysis process was condensed into five steps (Figure 3.5).

i. **Extraction** - Getting familiar with, transcribing, reviewing, and proofreading the answers of the nine interviewees, feedback the doubt answers, and requiring the interviewees to supplement.

ii. **Coding** - Encoding the keywords of the interviewers' replies and converting them into quantitative data (if necessary).

iii. **Categorizing** - Sorting codes with similar answers.

iv. **Topic** - The classified codes are placed into different topics according to the research questions and sorted again.

v. **Reporting** - Summarizing and verifying data results.

3.7.2 Questionnaire Survey

In this study, the quantitative data obtained from Questionnaire A and Questionnaire B were statistically analyzed using Microsoft Excel and the 28th edition of the IBM social science statistical software package (SPSS).

3.7.2.1 The Relative Important Index (RII)

Questionnaire A was to ask residents to rate their satisfaction with the landscape quality of Phase I of Project A with a 5-point scoring method. Therefore, it was significant to use the relative importance index (RII) as a statistical method to analyze the variables of questionnaire A. Furthermore, RII helps to determine the impact of the quality of each component of the real estate landscape on customers. In general, the relative importance index is calculated using the following formula:

$$RII = \frac{n_1 \times 1 + n_2 \times 2 + n_3 \times 3 + n_4 \times 4 + n_5 \times 5}{5 \times N}$$

* n of the above equation related to the 5-point evaluation of Landscape Quality: n_1-Strongly Dissatisfaction, n_2-Dissatisfaction, n_3-Neutral, n_4-Satisfaction, n_5-Strongly Satisfaction, respectively. N is the total number of respondents to the Questionnaire.

3.7.2.2 Quantitative Data Analysis Steps

The data analysis of the Questionnaire Survey of this study mainly includes the following steps:

i. **Transcription** - Questionnaire data is accessible to code to be quickly transcribed into Excel. The way of transcription data can facilitate subsequent

data processing (Braun & Clarke, 2006).

ii. **Checking and Editing** - The collected data were classified into different topics and sub-topics. Similar data are combined in a topic or a sub-topic. Different data were arranged in the form of tables. In this step, check whether there are errors in data transcription to avoid data deviation.

iii. **Analysis and Interpretation** - Summarize the content of topics and sub-topics, analyze the data carefully to find the core meaning of the information. For example, summarizing the essential statement of interviewers on a landscape quality management problem. Finally, explain the core meaning of these data in this study.

iv. **Summarizing** - The primary purpose of this step is to summarize the core meaning interpretation of data from different topics and sub-topics to find the core arguments of this study to help achieve the research objectives.

v. **Verification** - Verifying the validity of the data many times to ensure the valid data of this study. The second verification can reduce the fuzziness of the answers (Merriam & Tisdell, 2016). Therefore, data verification is a necessary means to ensure the accuracy of the data results and a necessary condition to obtain the effective conclusion of this study.

3.7.2.3 Response Rate

Table 3. 11: Questionnaire A & B response rate

Type	Target	Description of Respondents	Total Distributed	Total Received	Invalid	Received	Response Rate
A	Residents	The owner of the house in **Project A Phase I**, and the relatives or tenants of the owner.	308	182	35	147	47.7%
B	Potential Customers	Potential customers or buyers of **A project Phase II**	232	171	57	114	49.1%
* Total Sample Size of Survey Questionnaires: **540** (95% Confidence, 5% Margin of Error)						Total: 261	Average: 48.33%

A total of 540 questionnaires were distributed, and 261 valid questionnaires were recovered, with an average response rate of 48.33%.

- Questionnaire A sent 308 questionnaires to residents living in A project phase I and received 182 replies, of which 35 were invalid. Therefore, 147 valid questionnaires were recovered, with a response rate of 47.7%.

- Questionnaire B was sent to potential buyers of A project phase II sales center, 232 copies were sent, 171 questionnaires were received, and 57 invalid questionnaires were received. There were 114 valid questionnaires, and the response rate of questionnaire B was 49.1%,

3.7.2.4 Validity Analysis & Reliability of Questionnaire

3.7.2.4.1 Validity & Reliability of Questionnaire A

i. Validity Analysis

Questionnaire A was an attitude scaling. In order to test the rationality of the questionnaire design of questionnaire A, KMO (Kaiser Meyer Olkin) and Bartlett test of Sphericity were used to analyze the validity.

According to previous studies by scholars, in the validity test, if KMO > 0.9, the effect of factor analysis of the questionnaire is the best. If the KMO value of the questionnaire is higher than 0.8, it indicates that the validity of the research data is excellent and is very suitable for extracting information. If this value is between 0.7 and 0.8, the research data has good validity and is suitable for extracting information. If this value is between 0.6 and 0.7, it indicates the general validity of the research data, but it can be used to extract information. If this value is less than 0.6, the data is not suitable for extracting information. Validity analysis requires Bartlett's test, and the corresponding P-value needs to be less than 0.05 (Chung, Kim, & Abreu, 2004; Zhou, 2017).

After testing, the KMO value of questionnaire A is 0.925, and the P-value is less than 0.05 (Table 3.12), indicating that the validity of questionnaire a is excellent and suitable for data analysis.

Table 3. 12: KMO and Bartlett's test of Questionnaire A

ITEM		QUESTIONNAIRE A
KMO		0.925
Bartlett test of Sphericity	**Approx. Chi-Square**	719.253
	df	45
	P	0.000

ii. Reliability

Questionnaire A is an attitude scale. In order to test the data reliability and accuracy of questionnaire A, the Cronbach α test method was used to analyze the reliability of the questionnaire.

In the reliability analysis, it is necessary to analyze the α coefficient. If this value is higher than 0.8, it indicates that the reliability of the questionnaire is high. If the value is between 0.7 and 0.8, the reliability is good. If the value is between 0.6 and 0.7, the reliability is acceptable. If this value is less than 0.6, it indicates poor reliability (Chung, Kim, & Abreu, 2004; Zhou, 2017).

After testing, the α value of questionnaire A is 0.898 (Table 3.13), indicating that the answer reliability of questionnaire a is high and can be used for data analysis.

Table 3. 13: Cronbach reliability analysis of Questionnaire A

ITEMS	SAMPLE SIZE	CRONBACH α
10	147	0.898

3.7.2.4.2 Validity & Reliability of Questionnaire B

Since questionnaire B was a multiple-choice question, its validity analysis and reliability cannot be calculated. Usually, the reliability and validity analysis of non-quantitative questionnaires can only describe the logic of questionnaire making through words (Abreu, 2004) to reflect the reliability and validity of the questionnaire. However, the design basis and process of the questionnaire of this study have been discussed in detail, which is mentioned in the acceptance of questionnaire design. Therefore, the design of Questionnaire B was based on reliable primary data, which is reasonable and practical.

3.8 Ethical Considerations

This study considers the impact of ethical issues. All respondents must voluntarily sign their names on the recording notes and questionnaires with the contact information. Information that respondents do not want to leave contact information and signature is considered invalid. The purpose of this consideration is to ensure that participants participate in this study voluntarily and are willing to receive follow-up interviews to make up for the missing problems in the previous survey and verify the accuracy of the data in the future. Furthermore, since these respondents are willing to participate in the study, they can withdraw from the study for any reason. In addition, first of all, participants must be informed of the research objectives of this study, and their contact information must be kept confidential. Their answers only are used for the academic purpose of this study.

3.9 Research Limitations

This study is the same as other studies, with corresponding research limitations. The current research of landscape quality management is mainly based on the designer's perspective, and there is little research on the quality management system and tools of China's real estate landscape projects. Therefore, the research of this study is not deep enough, and the research content needs to be further improved. The research limitations of this study are listed as follows:

i. The sample size of this study is relatively small. Although the interviewees have deep experience, this study only selects nine suitable interviewees. In order to ensure the comprehensiveness of the research perspective, this study distributes the questionnaire to potential customers and residents. However, due to the impact of the current covid-19, there are some obstacles in the field survey, and only 540 respondents were selected.

ii. The landscape quality management challenges and influencing factors identified in this study are based on the project quality of Country Garden Group. The research on other companies needs to be revised according to their organization's actual situation to get better evaluation results.

iii. The interviewees of this study are all from the Landscape Design Center of Country Garden Group staff. Although these practitioners have many completed landscape project data as evidence, their answers are subjective.

iv . The regional applicability of this study applies to Guangdong Province, China. Because of China's vast territory, abundant resources, and vital diversity of natural resources, the climate, terrain, soil resources, water resources, and cultural customs of Guangdong Province of China, where the project is located, are different from other projects in other provinces. Therefore, this study is only applicable to Guangdong Province of China.

3.10 Process of Achieving Research Objectives

Chapter three aims to outline the research methods used to answer research questions, validate the Literature review and achieve the research objectives. The research process, participants, data analysis & collection, and sample selection process were discussed. This study followed the research methodology of this chapter from the beginning to the end. Therefore, this study's results and discussions must follow and be based on this chapter.

In this study, the research process of finding, analyzing, and solving problems is studied. First, through literature reading to understand the current quality management situation in China's real estate landscape projects. Second, comparing different quality management systems and tools to understand the latest quality management theory and

quality management tools related to Chinese real estate landscape projects. Thirdly, through literature reading, interviews, and questionnaire survey to collect the primary data to find out the current challenges of quality management faced by China's real estate landscape projects, and then summarize the influencing factors. Fourth, the analysis and verification are carried out to ensure the data's availability. Fifth, achieving the ultimate research objective of this study. To provide suggestions to improve the existing quality management evaluation tool for Chinese real estate landscape projects. Figure 3.6 shows how to achieve three research objectives.

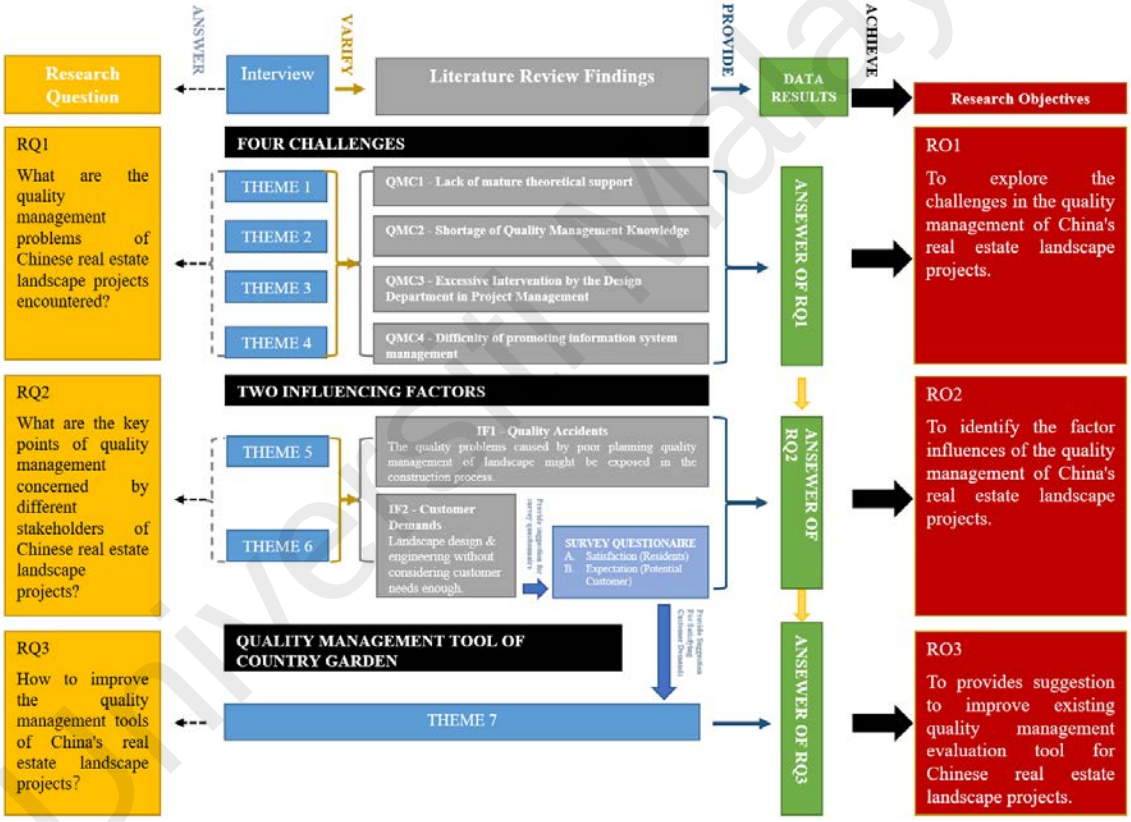


Figure 3. 6: Flow chart of how research objectives were achieved

CHAPTER 4 DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter mainly analyzed and explained the qualitative data collected by Interview and the quantitative data collected by Questionnaires A and B. The qualitative data of the interview has been summarized and transcribed many times and presented in quantitative forms. In addition, the data results of the Interview also provide the logical basis for the design of Questionnaires A and B. The following discussed the findings of Interview, Questionnaire A, and Questionnaire B, respectively.

4.2 Findings of Interview

The interview questions were mainly divided into Part B, Part C, and Part D, which respectively correspond to the realization of three research objectives (Table 4.1):

i. Part B - RO1. To explore the challenges in the quality management of China's real estate landscape projects. (Included Four Challenges, Challenge 1 to Challenge 4 Corresponding to Theme 1 to Theme 4 of interview)

ii. Part C- RO2. To identify the factor influences of the quality management of China's real estate landscape projects. (Included Two Factors, Quality Problem Itself Factor corresponds to Theme 5 of Interview, Customer Demands Corresponding to Topic 6 of Interview)

iii. Part D - RO3. To provide suggestions to improve existing quality management evaluation tools for Chinese real estate landscape projects. (Corresponding to Topic 7 of Interview)

Table 4. 1: The interview's findings correspond to the RO & Literature Review

PART	RESEARCH OBJECTIVE	THEME	TOPIC		QUESTIONS
Part B Challenges for Quality Management	**RO1.** To explore the challenges in the quality management of China's real estate landscape projects	Theme 1	Challenge 1	Lack of mature theoretical support	C1 – C3
		Theme 2	Challenge 2	Shortage of Quality Management Knowledge	C4 – C6
		Theme 3	Challenge 3	Excessive Intervention by the Design Department in Project Management	C7 - C9
		Theme 4	Challenge 4	The difficulty of promoting information system management	C10 – C15
Part C Influencing factors of Quality Management	**RO2**. To identify the factor influences of the quality management of China's real estate landscape projects	Theme 5	Factor 1	The factor of Poor-Quality Management in Landscape Project Planning	C16 – C21
		Theme 6	Factor 2	The factor of Quality Management in Satisfying Customer Demands	C22 – C29
Part D Landscape Quality Management Tool	**RO3.** To provide suggestions to improve existing quality management evaluation tools for Chinese real estate landscape projects.	Theme 7	Tool	Task statement/design specification as a checklist quality management tool	C30 – C40

4.2.1 Part A: Information of Interviewees

Table 4. 2: List of Interviewees

Information and Code of Interviewees								
Code	**Name**	**Gender**	**Education**	**Job Description**	**Qualification**	**Units**	**Working Experiences**	**No. of Projects (Above)**
I1	Du Doris	Female	Master	Design Director	Deputy Chief Engineer	Top Management	16	500
I2	Zhang Miao Bing	Female	Master	Construction Director	Principal Engineer		21	610
I3	Hu Meng Meng	Female	Master	Designer	Senior Engineer	Design Management	7	230
I4	He Jian Ming	Male	Master	Designer	Assistant Engineer		4	115
I5	Li Hong	Female	Master	Project Manager	Assistant Engineer		4	190
I6	Mao Yu Qing	Female	Master	Project Manager	Senior Engineer		7	331
I7	ZhaIng Yi Fan	Male	Degree	Draftsman	Engineer	Construction Management	5	63
I8	Zhong Qu Ying	Male	Degree	Construction Supervisor	Senior Engineer		6	50
I9	Huang Zhi Cheng	Male	Degree	Construction Manager	Assistant Engineer		5	55
						Average	**8.3**	**238.2**

These nine interviewees are senior practitioners and landscape experts of Chinese real estate landscape projects in the Country Garden Group. Their average working experience is 8.3 years, and the average number of projects they had participated in is 238.2. As discussed in the interview technique in Chapter three, these nine interviewees' achievements and work experiences can support their statements in the interview. Therefore, the answers of these nine interviewees are helpful to verify and identify the research objectives of this study, that is, the challenges of Chinese real estate landscape

project quality management, the influencing factors of landscape project quality management, and their views, attitudes, and opinions on current management tools. (Table 4.2). The following sections related to the interviewer's statement used codes to represent nine Chinese real estate landscape industry practitioners, such as Interviewee 1 Du Doris as I1, Interviewee 6 Mao Yu Qing as I6.

4.2.2 Part B: Exploring the Challenges for Landscape Quality Management (RO1)

4.2.2.1 Theme 1 Validated Challenge 1 - Lack of Mature Theoretical Support

4.2.2.1.1 Questions C1

C1. Do you think everyone is familiar with project management in the landscape design center of Country Garden Group? And why?

Table 4. 3: Why employees did not understand project management

*Explaining the reasons why employees did not understand project management knowledge.		
ITEMS	**INTERVIEWEES**	**RANK**
Employee job responsibilities/ the division of labor	I1, I2, I3, I4, I5, I6, I7, I8, I9	**1**
Only management can access	I1, I2, I3, I4, I5, I6, I7, I8	**2**
Employees just want to get the job done quickly	I2, I3, I4, I6	**3**
Lack of project management training	I6, I9	**4**
Lack of on-site management experience	I6, I8	**5**
The difference in work experience	I7	**6**

The unified answer given by all interviewees was that most employees do not understand project management, and only a few employees and senior leaders will be involved in project management. All interviewees attributed the first reason they did not understand project management to the fact that the division of labor was too meticulous, resulting in the inability of employees to participate in the whole life cycle of the project. The second is that employees paid more attention to any compressed work progress,

followed by a lack of project management knowledge training and on-site management experience. I7 added the difference in work experiences.

4.2.2.1.2 Questions C2

- *C2. What is your understanding of project management? What do you think about landscape project quality management is managing?*

Table 4. 4: Interviewees' understanding of project management

*Interviewees' knowledge *understanding* of project management from their past experiences.		
ITEMS	**INTERVIEWEES**	**RANK**
Project Planning to Closeup	I2, I3, I5, I6, I7	**1**
Achieve Objectives	I1, I4, I6, I7, I8	**2**
Schedule, Cost & Quality	I3, I4, I5, I6	**3**
Satisfaction (Developer, Customers & Clients)	I4, I6	**4**
Design Stage to Construction	I1	**5**

Firstly, most Interviewees believed that project management was to achieve objectives from project planning to closeup. Secondly, they understood that project management was related to schedule, progress, cost, and quality. I4 and I6 referred to the correlation of stakeholders. However, I1 stated that project management is only from design to construction (Table 4.4).

4.2.2.1.3 Questions C3

- *C3 - From your perspective, what is the relationship between PM theory and practical management experience in China's real estate projects?*

All interviewees said project management theory and practical management experience were complimentary and positive. I2 explained that "The ultimate purpose of management theory is to guide practice better, but the practical management experience

is the source of theory." I4 agreed with the above relationship but added that China's real estate industry relies on past project experience rather than management theory, that is, a case study. I6 stated that "The professional theoretical knowledge can enable us to improve efficiency and avoid detours in management."

4.2.2.2 Theme 2 Validated Challenge 2 - Shortage of Quality Management Knowledge

4.2.2.2.1 Question C4

- *C4. Do you understand the quality management system? Have you ever heard about the QMS?*

Everyone did not know the quality management system.

4.2.2.2.2 Question C5

All interviewees have quality management awareness, and they believe that landscape quality needs to be paid great attention to it. However, all respondents said priority should be given to meeting landscape projects' basic landscape quality needs, such as acceptance standards and specifications, to achieve the design objectives (I7). The project quality, time, and cost should be considered comprehensively (I8 & I9).

4.2.2.2.3 Question C6

- *C6. Do you think the quality of landscape projects needs or not special attention and management?*

Table 4. 5: Reasons why landscape needs to be care

*Explaining why interviewees thought *landscape* quality needs to have been cared for.		
REASONS	**INTERVIEWEES**	**RANK**
Measure the quality of real estate project`s (landscape value)	I1, I2, I3, I4, I5, I6	1
Engineering details affect the accuracy and quality of real estate projects	I2, I6, I7, I8, I9	2
Landscapes affect people's psychological feelings	I4, I5, I6	3
Reduce guest complaints about the landscape section	I1, I2	4
The landscape management was overly interfered with	I7	5

All interviewees agreed that landscape quality needs to be paid attention to and put forward the above views (Table 4.6).

4.2.2.3 Theme 3 Validated Challenge 3 - Excessive Intervention by the Design Department in Project Management

4.2.2.3.1 Question C7

- *C7. Which phase are the most important in the real estate landscape project (Design Preparation Phase, Design Phase, Construction Phase, Pre-Use Preparation Phase, and Warranty Phase)? And why?*

Table 4. 6: The importance of landscape project phase

*Explaining which construction phase was the most important for a real estate landscape project quality.			
PHASE	**STATEMENTS**	**INTERVIEWEES**	**RANK**
Step 2. Design	• Design effects and outcomes（I1, I2, I3, I4, I5, I6, I7, I8, I9）- "Landscape design outcomes are often the most important observation point for homeowners and house buyers." (I9) • "Basis for project construction (Pre-production information) and tools (design drawings). "(I4&I6) • Control of design quality and cost.（I8）	I1, I2, I3, I4, I5, I6, I8, I9	1
Step 3. Construction	• Construction quality - *"The key to the presentation of the design outcomes."* (I1) • Understanding deviations - *"Construction and design understanding deviations."* (I3) • Quality influence - *"The precision and meticulousness of the construction will directly affect the overall quality of the project." (*I6) • Risk of sudden construction and risk of change of drawings (I7). • The professionalism of the construction party *"Many times, different constructor work on the same drawing with different effects."* (I8)	I1, I6, I7, I8	2
Step 1. Design Preparation	• The foundation of design quality（I2）	I2, I4, I5	3
Step 4. Pre-Use Preparation	NIL		
Step 5. Warranty	NIL		

4.2.2.3.2 Question C8

- *C8. Many scholars say that the design department manages construction projects in China. Do you agree with this statement? (If yes, please describe your understanding of the advantages and disadvantages of doing so? If not, which department has the most significant impact on landscape quality?)*

I1 & I7 disagreed that the landscape design department has the most significant impact on the landscape quality. " *The landscape quality still needs to control the site, careful construction, material selection, seedling selection, etc., which has an impact on the landscape quality.*" (I1)

"*The design phase mainly affects the effect of the scheme, and only the structural design will affect the safety and appropriate comfort experience.*" (I7)

The rest of the interviewees agreed with the research results that the landscape design department had the most significant impact on the landscape quality. It gives the following reasons:

Table 4. 7: Influence of design department on the quality of landscape

*Explaining How the design department affected the quality and management of a real estate landscape project.			
ITEMS	**DESCRIPTION**	**INTERVIEWEE**	**RANK**
Landscape Characteristics	The results of the work of the design department determine the psychological feeling that the landscape project brings to people.	I2, I4, I5, I6, I8	1
Construction Quality & Delivery Quality	The design department proposes construction quality requirements to determine the effect of the landscape project and the quality of delivery.	I2, I3, I4, I6	2
Design Quality	The quality of the design determines the quality of the landscape, such as the rationality of the design and the optimization of the site characteristics.	I2, I3, I4	3
Drawing Quality	Drawing quality determines project quality.	I4, I6, I8	4
Global Control	The design department knows all the information about the project better than other departments, such as attributes, positioning, construction process, materials, and final results.	I6, I8	5
Degree of Intervention	The degree of intervention of the design department in any landscape project is high enough.	I8	6
Project Costs	The designer's idea controls the cost of the project.	I9	6

4.2.2.3.3 Question C9

- *C9. As landscape practitioners, we often talk about the construction party's failure to construct according to the design drawings, the differences between the project concept and the designer's intention, and the design changes caused by other reasons. According to the drawings, what do you think are the main reasons for the failure to construct, product differences, and design changes?*

Table 4. 8: Stakeholder's conflicts between design & construction

*Explaining the conflicts between the design and the construction department (Why & How).			
STAKEHOLDER	**DESCRIPTION**	**INTERVIEWEE**	**RANK**
Design	Management Awareness - Less involved in project Site management	I1, I2, I4, I5, I6, I7	1
	Communication - Ineffective communication	I2, I4, I5, I6, I7, I9	2
	Professional Ability - Lack of professionalism (do not understand the project information, do not understand the site, drawing expression)	I2, I4, I5, I6, I7	3
	Quality awareness - Weak ability to predict	I4, I6, I9	4
	Working Attitude - The design idea is too ideal	I7, I9	5
Construction	Professional ability - Construction party qualification and professional ability	I1, I2, I4, I5, I6, I9	1
	Communication skills - Refuse feedback, unauthorized decision	I2, I4, I5, I6, I7	2
	Quality awareness - Lack of construction quality requirements	I1, I4, I7, I8, I9	3
	Management awareness - Compress costs privately	I2, I3, I5, I6	4
	Working attitude - Blindly rushing to work	I3, I7	5

4.2.2.4 Theme 4 Validated Challenge 4 - The difficulty of promoting information system management

4.2.2.4.1 Question C10

- *C10. Do you know or have used BIM before? What do you know BIM can do?*

Table 4. 9: The kownledge level about BIM

*What was the degree/level of their understanding of BIM.			
LEVEL	**DESCRIPTION**	**INTERVIEWEE**	**RANK**
NON	NIL	I5, I7	NIL
Little	Modeling Software	I1, I2, I3, I4, I6, I7, I8, I9	1
	Information management tools (information sharing and collaborative work)	I1, I2, I4, I7, I9	2
	Simulating the project process helps with risk anticipation	I3, I4, I5, I7	3
	Increase productivity and quality (fewer problems, cost savings)	I6, I7, I9	4
Very	NIL	NIL	NIL

I5 and I7 did not understand BIM, but their cognition of BIM was modeling software, information management tools, simulating project processes, helping risk prediction, and improving work efficiency and quality.

4.2.2.4.2 Question C11

- *C11. We use the OA system to manage the project in our daily work. What do you think the OA information system can bring to our work? Can OA help us manage the quality?*

The only information management system used by the Interviewees' enterprises was the OA system. The interviewees believed that the OA system could manage the project schedule and data storage, but quality management has nothing to do.

Table 4. 10: The role of the OA

*Explaining the role of the OA Information Management System in the current organization		
FUNCTION	**INTERVIEWEE**	**RANK**
Project Progress	I1, I2, I3, I4, I5, I6, I7, I8, I9	1
Data Find and Save	I1, I2, I5, I6	2
Quality Management	NIL	

4.2.2.4.3 Question C12

- *C12. Do you make good use of traditional management tools or information management tools for quality management? What do you think of other practitioners in the industry?*

Table 4. 11: Reasons for failure to implement BIM software

*Explaining the reasons for failure to implement BIM and other information management software		
REASONS	**INTERVIEWEE**	**RANK**
High costs	I1, I2, I3, I6, I7, I8, I9	1
Domestic demand is insufficient, and the penetration rate is low	I1, I2, I4, I6, I7	2
It was too difficult to study and use	I1, I2, I3, I6,	3
The perception of the employees	I2, I4, I5	4

The Interviewees said that the main reason why the information system model could not be popularized was that the cost of learning and replacing tools was too high, then the penetration rate was low due to insufficient domestic demand, rank 3 showed that the operation was too tricky. Moreover, the final is the perception of the employees.

"*First of all, the existing design personnel can already meet the needs of design, construction, and drawing, so the internal demand for information management tools promotion is insufficient. At the same time, BIM needs the threshold of professionals. The existing personnel does not have the reserve of professional knowledge, so they need to study and be trained. Generally, some real estate companies do not have the sense of foresight and will not increase relevant personnel in the short term.* " (I1)

4.2.2.4.4 Question C13

- *C13. Many scholars demonstrated that BIM could benefit a construction project, but what do you think is why it cannot rise in China's real estate industry?*

All Interviewees said that they and other practitioners are currently more inclined to use the traditional management tools they are good at, such as lists, notes, and excel, to record, find and check the specific quality requirements of the project.

4.2.2.4.5 Questions C14 & C15

- *C14. From your point of view, apart from the four challenges I just mentioned, are there any other chall·enges for landscape project quality management?*

- *C15. Is there anything about Part B you disagree with?*

All Interviewees agreed with the four quality management challenges explored in this study.

4.2.3 Part C: The Influencing Factors in Landscape Quality Management (RO2)

4.2.3.1 Theme 5 Validated Factor 1 - The Factor of Poor-Quality Management in Landscape Project Planning

4.2.3.1.1 Question C16

- *C16. We usually regard the real estate project as a complete product, and the landscape project is only one part of the product. What impact do you think the quality of the landscape has on the whole product?*

Table 4. 12: The impact of landscape quality on product value

*Explaining how did the landscape quality affect the real estate project value		
INFLUENCE	**INTERVIEWEE**	**RANK**
Improve occupant satisfaction (psychological feelings & spiritual pursuits)	I1, I2, I4, I5, I7, I8, I9	1
Improve economic efficiency (increase price & customer desire to buy)	I1, I2, I3, I6, I7, I9	2
Raise the profile of real estate projects	I1, I4, I5, I6	3

4.2.3.1.2 Question C17 & C18

- *C17. In the previously long period, our company's logic in developing real estate projects was to ensure product quality and reduce costs as much as possible based on standards, which can bring high turnover. What problems do you think the project has encountered under the development model of high turnover?*

- *C18. However, in recent years, our company began to abandon the high turnover mode and switched to the development mode of improving project quality. What do you think caused the company to focus on project quality?*

Table 4. 13: The reason why focusing on landscape project quality

*Why & What caused their organization to transform the high turnover model to landscape project quality.		
REASONS	**INTERVIEWEE**	**RANK**
The Higher Customer Quality Expectations & Demands • More landscape quality requirements (I1, I3, I7) • Increase in complaints (I2, I4) • Design changes increase（I4, I5） • Psychological needs (I3, I5, I7, I9) • Aesthetic improvement (I6)	I1, I2, I3, I4, I5, I6, I7, I9	1
Quality Problems & Risks	I1, I3, I4, I5, I6, I8, I9	2
Market Competition & Brand Value	I1, I3, I6, I7, I8	3
Severely Homogenization	I1, I3, I5, I6	4

4.2.3.1.3 Question C19

- *C19. What do you think are the quality problems faced by our company's landscape project?*

Table 4. 14: Quality problems of current company's landscape projects

*Explaining the common quality problems in their company's past and current landscape projects.		
REASON	**INTERVIEWEE**	**RANK**
Construction issues • Construction process (I6) • Construction techniques (I2, I6) • Construction was not done according to drawings (I1, I8, I9)	I1, I2, I6, I8, I9	1
Design issues • Design limitations (I6) • Homogenization (I3, I4) • Lack of attractiveness (I5)	I3, I4, I5, I6	2
Manage issues • Lack of management theory (I2) • Focus too much on the short term and neglect the long term for quality performance (I4, I7)	I2, I4, I7	3

4.2.3.1.4 Question C20

- *C20. Do you think you can find the quality problems of the project in time in the process of landscape project management? Why? Or at what stage of the landscape project are you more likely to find quality problems?*

All interviewees said that quality problems could not be found in time. Most interviewees believed that landscape project quality problems were usually exposed in the construction stage, mainly due to the following reasons:

"*1. The construction period is short. In case of quality problems of materials or seedlings during construction, sometimes it will be reluctantly used because of the short construction period; 2. The absence of designers is also one of the reasons why the construction quality control is not in place.*" (I1)

4.2.3.1.5 Question C21

- *C21. What major quality management problems have you encountered in the landscape projects you have participated in in the past? Are these problems difficult to solve? Why?*

Table 4. 15: Typical landscape quality problems encountered by interviewers

*What was the most typical landscape quality problems encountered in their past working experiences		
QUALITY PROBLEM	**STATEMENTS**	**INTERVIEWEE**
Landscape Engineering Quality	*"The poor quality of materials or seedlings affects the quality of the project. These problems need to be communicated with the construction party. If the construction period is not urgent, it is easier to solve them. If the construction period is very urgent, we can only find the person in charge of construction to communicate repeatedly and make a balance before ensuring the quality and construction period."*	I1
Outcome Bias	*"Some achievements in the construction process are inconsistent with the design, which is difficult to solve because if the construction party has completed, correction means the consumption of project cost."* (I3) *"The completed project is inconsistent with the publicity effect, resulting in customer complaints. Increase change cost."* (I4)	I3 & I4
Changes in the Quality of Landscape Design	*"The design quality often exceeds the budget due to financial problems or the material the constructor cannot find the designer wants. This will cause the management personnel to adjust the project quality to avoid delay temporarily."*	I7

4.2.3.2 Theme 6 Validated Factor 2 & Supported Questionnaires - The Factor of Quality Management in Satisfying Customer Demands

4.2.3.2.1 Question C22

- *C22. The subtitle of customer complaint will be involved in each project's project planning and post-evaluation stage. Why do we do this?*

Table 4. 16: Role Of Risk Analysis on Customer Complaints

*What was their understanding of the function of risk analysis on customer complaints		
REASON	**INTERVIEWEE**	**RANK**
Understand the needs of customers to provide a construction basis	I1, I2, I3, I4, I5, I6, I7	2
Meet the landscape quality expectations of contemporary customers	I1, I2, I3, I4, I5, I6, I7, I8, I9	1
Risk prediction to avoid the risk of complaining about the quality	I2, I4, I6	4
Experience and lessons of landscape quality management	I1, I6	5
Improve landscape value	I1, I2, I3, I5, I6, I7	3

"*Customer complaints are our direction to solve problems. Customer complaints can expose the project's defects and protect the project's value when predicting the customer's demands early. The customer complaints in the post-evaluation report are more of a lesson and provide some reference basis for the next project.* " (I1)

"*In order to better find and solve problems, customer complaints are the landscape we most want to see. Only those suitable for the public are good landscapes. Therefore, we should constantly summarize and analyze all kinds of occurrences.* " (I5)

4.2.3.2.2 Question C23

- *C23. What are the most complained problems by customers in the projects you have participated in?*

Table 4. 17: Interviewees' landscape project complained by customers

*What were the complaints of their past landscape projects from customers.		
REASON	**INTERVIEWEE**	**RANK**
Landscape ancillary facilities - humanized facilities	I2	4
Greening system - green coverage	I1, I2	3
Expectation deviation of landscape design and landscape engineering	I3, I4, I5, I7	1
Project Delay	I6	4
Greening system - Plant quality	I8, I9	2

4.2.3.2.3 Question C24

- *C24. Some of the similar projects developed by our company in the same city will be complained by customers. However, some projects will not be complained about. Why?*

Table 4. 18: Analysis of similar projects complained by customers

*Why did the similar project have different complaints from customers.		
REASON	**INTERVIEWEE**	**RANK**
Differences in project positioning	I1, I5, I6	3
The significant difference in landscape quality (construction)	I1, I2, I3, I4	2
Research on wrong customer group & negative customer relationship	I3, I4, I5, I6, I7, I8	1

"The target customer groups of all projects are different; the customer demands and project positioning for real estate landscape products are different. If there are many people with sport's needs, they will not have an opinion on the noise generated by the stadium. If there are many people with pets, they will not reject the increase of pet activity area. Their needs are inconsistent, so their concerns are inconsistent." (I1)

4.2.3.2.4 Question C25

- *C25. What changes do you think have taken place in the attitude towards the landscape of the practitioners related to the current real estate landscape project compared with the previous ones? Why do you think this change happened?*

Table 4. 19: Views of practitioners on the landscape industry

*Explaining the views of practitioners on the status change and causes in the current landscape industry			
ITEMS	**REASONS**	**INTERVIEWEE**	**RANK**
Landscape design quality (included Landscape Characteristics)	Creativity demand	I3, I4, I7	6
	Customer Satisfaction & Market Demand	I1, I2, I3, I4, I5, I6, I7, I8, I9	1
	The need for diversity	I5, I8	8
	Human needs	I2, I5, I8, I9	5
	Aesthetic improvement	I7	9
Landscape Value	The need for project grades	I1, I2, I6	7
	Customer service and experience	I1, I2, I4, I5, I6, I8, I9	2
	Premium power of real estate products	I1, I2, I3, I4, I5, I6, I8	3
Landscape Engineering	Care about landscape engineering quality	I2, I6, I7, I8, I9	4

Interviewees believed that the current status of real estate landscape practitioners is getting higher because customers' expectations for landscape and the market demand for landscape are increasing, followed by customer service and customer experience, product premium, improvement of project quality, humanization, innovation, diversity, and aesthetics.

4.2.3.2.5 Question C26

- *C26. What is the most significant change in customers' attitude towards the landscape? Do you think their attitude impacts the quality of landscape projects? What does it affect?*

Table 4. 20: Practitioners' views on customers' attitude

*Practitioners' views on the reasons for the change of customers' attitude towards landscape projects			
ITEMS	**REASONS**	**INTERVIEWEE**	**RANK**
Landscape design quality (Included Landscape characteristics)	Improvement of landscape function demand	I1, I2, I3, I4, I6, I7	1
	Improvement of landscape design quality	I2, I3, I4, I6, I9	2
	The psychological feeling brought by landscape	I5, I6, I7	4
Landscape Value	Not satisfied with low-grade project positioning	I5	6
	Market competition	I1, I8	5
Landscape Engineering	Improve the attention of landscape engineering quality	I2, I3, I8, I9	3

Most of the Interviewees thought that the current customers pay more attention to the landscape function and the overall quality of landscape design than in the past, followed by the quality of landscape engineering, the psychological feeling brought by landscape design, market competition (project quality), and project positioning.

"For example, my parents live in the countryside. They do not understand the landscape at all. They have not considered what kind of living environment they need at all. Some can eat and wear. Furthermore, I just want to have my small courtyard, which can let me plant flowers and grass to meet my spiritual needs." (I7)

4.2.3.2.6 Question C27

- *C27. What questions do you think I should design if I want to distribute a questionnaire to study the impact of customer needs on landscape quality management? Please list 1-2 suggestions and questions that you think are most useful.*

Table 4. 21: Interviewees' suggestions for questionnaire design

*What are the Interviewees' suggestions on the questionnaire question design of this study.		
1. Quality Requirements - Expectation		
ITEMS OF LANDSCAPE	**INTERVIEWEE**	**RANK**
Landscape characteristics	I1 I2 I3 I4 I5 I6 I8 I9	1
Landscape function and space	I1 I2 I3 I4 I6 I9	2
Landscape elements	I2 I3 I4 I6 I7	3
Landscape engineering	I1 I3	4
2. Quality Evaluation - Satisfaction		
ITEMS OF LANDSCAPE	**INTERVIEWEE**	**RANK**
Design quality	I3 I5 I8	1
Engineering quality	I1 I3	2

All interviewees suggested that the questionnaire should investigate customers' quality needs for landscape projects, while only four interviewees suggested that the questionnaire should allow customers to evaluate the quality of an existing landscape project (I1, I3, I5 I8). In the questionnaire of quality demand, the interviewee thought landscape characteristics should be the essential item, followed by landscape function and space, landscape elements, and landscape engineering. The quality evaluation recommends investigating the design quality evaluation and engineering quality evaluation of landscape projects by customers.

4.2.3.2.7 Question C28 & C29

- *C28. Which of the two main factors affecting landscape quality management we just discussed is more important?*

- *C29. Do you think other important factors affect the quality of landscape projects I have not mentioned?*

Table 4. 22: Comparison between customer demand & quality itself

ITEMS	INTERVIEWEE	RANK
Customer Demands	I3 I4 I5 I6	1
Quality Itself	I1 I7 I9	2
Same	I2 I8	3

I6 demonstrated that customer demand is more critical due to the real estate products that need to be purchased by customers. *"Landscape is the product of the human pursuit of spiritual needs. The quality of the landscape should first meet the needs of customers. If we blindly pursue design quality and engineering quality and ignore customers' needs, the landscape will lose its soul. " (*I5)

Table 4. 23: Key items of influencing factors

FACTOR TYPE	ITEMS	INTERVIEWEES	RANK
Customer Demands	landscape Project Product value	I1 I2 I3 I4 I5 I6 I8	1
Customer Demands	Greening System	I1 I2 I3 I4 I7 I8 I9	2
Quality Itself	Landscape Engineering (Construction).	I1 I3 I5 I7 I9	3
Quality Itself	Landscape costs	I1 I2 I4 I7	4
Customer Demands	Landscape ecology	I2	5

The interviewees who paid more attention to quality said that the accepted standard of essential structure quality of landscape project cannot be changed. *"Some interviewees said that the landscape value and greening system had the most significant impact on customer demand, followed by landscape ecology. The most extensive relationship with the quality itself is landscape engineering, followed by landscape cost. "* (17)

4.2.4 Part D: Landscape Quality Management Tool (RO3)

4.2.4.1 Theme 7 Explored A Quality Management Tool of Country Garden Group

4.2.4.1.1 Question C30

- *C30. What quality management tools are you familiar with? (Which do you think is more prevalent in the real estate industry? What is your favorite quality management method /tool?) There are seven quality management tools commonly used in China. Do you know that the checklist tool is used in our Task Statement/ Design Specification?*

Respondents were not familiar with quality management tools other than the checklist. They all expressed that they preferred and were good at using task statements (Checklist tool).

4.2.4.1.2 Question C31

- *C31. Do you think our Task Statement/ Design Specification will help you manage the quality of the project? Please elaborate on what aspects and how to help you manage quality?*

Most respondents said that task statements could help quality management at different project requirements, design requirements, developer requirements, customer requirements, and construction requirements. The "task statement" will indicate the design contents, garden construction cost, and greening cost so that I can preliminarily control the overall project (I6).

I1 and I2 believe that the task statement can only ensure that the design port can complete the work with the minimum standard. The mission statement can only

guarantee whether the design port can work according to the group's requirements but cannot guarantee the quality of an actual project.

4.2.4.1.3 Question C32

- *C32. When you encounter problems in the past project, can you trace the causes of project quality problems through the Checklist Tool/ Task Statement/ Design Specification?*

All interviewees said they could trace the quality problems of the landscape project through the task statement/ checklist.

I1 said that "*the task statement can let the staff know more clearly what they need to do in their work, and there will be no mistakes when they work according to the task statement."*

I7 said that "*the task statement can help me understand that the project has a problem at some steps so that I can trace it and how to solve the problems in the future.*"

4.2.4.1.4 Question C33

- *C33. What are the advantages and disadvantages of our Task Statement/ Design Specification? Please list them.*

Table 4. 24: Advantages & Disadvantages of Task Statement

ADVANTAGE	DISADVANTAGE
• Convenience & conciseness（I1, I2, I3, I4, I5, I6, I7, I8, I9） • Be able to understand the basic information of the project (I5) • Systems relatively (I6)	• Not comprehensive enough (I1, I2, I3, I6) • It cannot be kept pace with market demand (I4, I5) • Unable to know the project surroundings (I6) • Lack of description of the project management control process and the progress of the project (I7)

All interviewees believed that convenience and conciseness were the most significant advantages of task statements, while incompleteness was the main disadvantage.

I4 and I5 thought that the task statement could not be synchronized with the market demand and customer demand.

I6 added that it lacked the surrounding information of the project, while I7 suggested increasing the project control process and monitoring the project progress.

4.2.4.1.5 Question C34

- *C34. Do you think our Task Statement/ Design Specification covers the most crucial checklist in every real estate landscape project workflow? What does completing these checklists mean?*

All interviewees said that the task statement did not cover every part of a real estate landscape project, especially the conflict between design and customer needs. All interviewees said that completing the work according to the task statement can ensure the correctness of their work. That is, the project meets the essential quality needs.

4.2.4.1.6 Question C35

- *C35. Do you think the Task Statement/ Design Specification can accurately express the needs of each stakeholder, especially customer demands?*

All interviewees said that the current task statement could not reflect the customer's needs. I1 explained that "*the task statement is the preliminary communication between the design and developer, the customer's needs need to be investigated, so the design task statement cannot fulfill the overall stakeholders' requirements.*" I7 said that "*it is more for customers to find in the group's standard material library, but it is not necessarily what the owner wants.*"

4.2.4.1.7 Question C36

- *C36. Much docking, communication, and coordination work cannot be avoided in daily work. How did you do it? Do you think these communication efforts impact the quality of the project? Whom do you think communication with has the most significant impact on quality?*

Table 4. 25: Paired Comparison Table of Importance of stakeholder mutual evaluation

	Top Management	Design	Management	Construction	Other Stakeholder (Customer)
Top Management（I1, I2）	/	0	0	2 (I1, I2)	0
Design (I3, I4, I7)	0	/	1 (I3, I7)	2 (I4, I7)	3 (I3, I4, I7)
Management (I5, I6)	1 (I5)	2 (I5, I6)	/	2 (I5, I6)	2 (I5, I6)
Construction (I8, I9)	0	2 (I8, I9)	0	/	2 (I8, I9)
Other Stakeholder (Customer)	/ （Survey）				
COUNT	1	4	2	6	7
RANK	5	3	4	2	1

4.2.4.1.8 Question C37

- *C37. Do you think effective communication can reduce quality problems?*

All respondents believe that effective communication can reduce quality problems. I6: "*Effective communication can reduce quality problems, provide effective feedback on construction quality, and supervise and audit the purchase of materials.*"

4.2.4.1.9 Question C38

- *C38. Our company has put forward the concept of BIM before. Why do you think everyone resists the introduction of new concepts? (If reform is needed, will the use of new tools bring resistance to employees? Do you have any suggestions?)*

Respondents mentioned that organizations' introduction of new tools relates to learning cost, time cost, and energy consumption. "The new concept requires us to get rid of the old work thinking and need time to learn new concepts. In today's high turnover and benefit-oriented society, more people are willing to complete the task step by step. " (i5). The solutions proposed by the respondents include training, reward mechanism, and assessment mechanism.

4.2.4.1.10 Question C39

- *C39. What other aspects do you think the design specification should cover to help us with quality management better?*

I1 and I2 believed that the quality of suppliers and construction teams should be evaluated.

I3 thought that the task statement could properly the schedule part and the problems in each stage.

I4 said that the detailed rules and specific requirements of landscape design increase customer demand, and I6 believes that the project evaluation items and remarks column should be added.

I7 stated that "*often the deviation of results is due to the deviation of the process,*" so the task statement should add items of management control process.

4.2.4.1.11 Question C40

- *C40. Do you have anything to add about quality management tools or the design specification?* (I4 stated that the task statement should add landscape elements and space required by customers.)

4.3 Findings of Questionnaire A

Questionnaire A was distributed to 308 residents of A Project Phase I, and Questionaire A related to RO2 (To identify the factor influences of the quality management of China's real estate landscape projects), which explored the customer demands in real estate project quality (Theme 6 of Interview).

A Project Phase I was a representative high-end landscape project of China real estate in 2018. It was also an innovative project developed by Country Garden Group to break through the previous standardized model. After completing the A project, it has won many of China's real estate landscape design awards and landscape quality awards in China, and it has also become the typical landscape project that the Chinese real estate industry competes to imitate.

The question source of questionnaire A was mainly based on the interviewees' answers in Theme 6 of the interview. It mainly discussed the residents' satisfaction with the landscape quality of the current residential area in phase I of project A to understand whether the positioning and development of the project were accurate and whether the landscape quality met the expectations of customers.

According to the reasoning logic, process, and conclusion of the questionnaire design described in the previous section, Questionnaire A was divided into four parts: basic information of residents, evaluation of landscape characteristics, evaluation of Landscape Design & Civil Engineering and landscape quality evaluation.

4.3.1 Section A: Basic Information of Residents

Table 4. 26: Basic information of residents

Items	No of Respondents * Total Respondents: 147	Percentage (%)	Rank
A1. GENDER			
Male	73	49.66	2
Female	74	50.34	1
A2. AGE			
Youth (19-45)	113	76.87	1
Middle Age (46-69)	30	20.41	2
Aged (Above 69)	4	2.72	3
A3. TIME IN HOME			
Weekend	51	34.69	3
All-day	48	32.65	4
Morning	38	25.85	5
Afternoon	55	37.41	2
Night	81	55.10	1
A4. HOUSEHOLDS			
One	14	9.52	3
Two	28	19.05	2
Three and above	105	71.43	1
A5. ELDERLY PERSONS			
Yes	90	61.22	1
Not	57	38.78	2
A6. PREGNANT MOTHERS & CHILDREN			
Yes	107	72.79	1
Not	40	27.21	2

The proportion of men and women in questionnaire A is 50%. The age of the respondents is mainly in youth (19-45) 79.87%, and the elderly over 69 account for only 2.72%. More respondents stayed in the community in the evening, afternoon, and weekend, accounting for 55.1%, 37.41%, and 34.69%, respectively. 71% of respondents

had three or more family members. 61.22% of respondents had older adults at home. 72.79% of respondents had pregnant women and children in their families.

4.3.2 Section B: Evaluation of Landscape Characteristics (RO2)

Table 4. 27: Evaluation of landscape characteristics

Items	No of respondents for each category * Total Respondents: 147					RII = (∑W/A*N)	Rank
	Strongly Dissatisfied	Unsatisfactory	Normal	Satisfactory	Strongly Satisfied		
A7. CONVENIENCE							
Auxiliary Services Facilities	5	2	25	55	60	0.82	1
Traffic Convenience	2	3	30	61	51	0.81	2
Pedestrian	3	2	32	55	55	0.81	2
Auxiliary Commercial Facilities	6	3	42	56	40	0.76	3
Communication Space	5	7	43	52	40	0.76	3
Intellectualization	6	7	41	52	41	0.76	3
Auxiliary Education Facilities	7	9	41	45	45	0.75	4
Suitability for people of all ages	9	1	52	47	38	0.74	5
A8. HEALTH & SAFETY							
Pedestrian system separated from vehicle system	3	6	30	45	63	0.82	1
Epidemic prevention	4	5	35	37	66	0.81	2
Noise & Shock protection	3	7	28	59	50	0.80	3
Sunlight & Air	3	5	32	62	45	0.79	4
Security System	8	1	37	56	45	0.78	5
Logistics system	7	3	38	58	41	0.77	6
A9. OTHER CHARACTERISTICS							
Ecology	7	4	24	44	68	0.82	1
Practicability / Applicability / Usability	6	4	35	40	62	0.80	2

Participatory & Interactive	**4**	**7**	**32**	**53**	**51**	**0.79**	**3**
Comfort	**7**	**3**	**32**	**63**	**42**	**0.78**	**4**
Education	**8**	**5**	**25**	**66**	**43**	**0.78**	**4**
Artistry	**7**	**5**	**38**	**50**	**47**	**0.77**	**5**
Landscape Value	**3**	**3**	**51**	**46**	**44**	**0.77**	**5**
Creativity	**8**	**6**	**56**	**38**	**39**	**0.73**	**6**

A7 is the satisfaction evaluation of landscape convenience, in which auxiliary services facilities ranked 1 (RII = 0.82), traffic convinces, and pedestrian ranked 2 (RII = 0.81), and rank five sustainability for people of all ages is considered the most dissatisfied among convenience (RII = 0.74).

A8 is the evaluation of environmental health and safety satisfaction, in which the pedestrian system separated from the vehicle system is rank 1 (RII = 0.82) and epidemic prevention is rank 2 (RII = 0.81). The most dissatisfied health and safety factors were the security system (RII = 0.78), which was ranked fifth, and the logistics system (RII = 0.77).

A9 was to ask residents to evaluate the satisfaction of other landscape characteristics. Residents were most satisfied with ecology (Rank 1, RII = 0.82) and practicality/ applicability/ usability (Rank 2, RII = 0.80), but creativity is rank 6 (RII = 0.73).

4.3.3 Section C: Evaluation of Landscape Design & Civil Engineering Quality (RO2)

Table 4. 28: Evaluation of landscape design & civil engineering quality

Items	No of respondents for each category * Total Respondents: 147					RII = (∑W/A*N)	Rank
	Strongly Dissatisfied	Unsatisfactory	Normal	Satisfactory	Strongly Satisfied		
A10. LANDSCAPE FUNCTION & SPACE							
Central Landscape	5	7	35	38	62	0.80	1
Entrance Area	7	6	29	58	47	0.78	2
Swimming Pool Area	10	9	25	45	58	0.78	2
Multifunctional Interactive Waterscape	7	5	39	41	55	0.78	2
Multifunctional Activity Area	9	5	40	39	54	0.77	3
Platform Area	5	7	54	44	37	0.74	4
A11. LANDSCAPE ELEMENTS							
Entrance identification	7	5	26	62	47	0.79	1
Swimming Pool	9	13	22	35	68	0.79	1
Square	6	6	34	48	53	0.79	1
Outdoor Stage	7	9	33	38	60	0.78	2
Water Landscape	12	7	30	43	55	0.77	3
Flower Rack / Pavilion	7	8	38	42	52	0.77	3
Outdoor Living Room	9	8	33	46	51	0.77	3
Fitness Ground	5	8	48	43	43	0.75	4
Feature Wall	4	7	57	39	40	0.74	5
Arch	9	9	52	35	42	0.73	6
Children's Playground	9	6	54	36	42	0.73	6
Court	4	16	49	38	40	0.73	6
Running Path	12	6	54	29	46	0.72	7
Pet Space	8	9	55	35	40	0.72	7
Function Lawn	9	9	57	34	38	0.71	8

A13. PAVEMENT SYSTEM							
Pavement form and material	**3**	**7**	**47**	**51**	**39**	**0.76**	**1**
Safety of pavement	**4**	**6**	**52**	**38**	**47**	**0.76**	**1**
A14. GREEN SYSTEM							
Green space	**8**	**4**	**35**	**39**	**61**	**0.79**	**1**
Grass	**6**	**12**	**24**	**50**	**55**	**0.79**	**1**
Greening coverage	**7**	**5**	**29**	**59**	**47**	**0.78**	**2**
Tree	**7**	**8**	**24**	**62**	**46**	**0.78**	**2**
Plant quality	**3**	**9**	**48**	**48**	**39**	**0.75**	**3**
shrub	**4**	**8**	**64**	**32**	**39**	**0.73**	**4**
A15. LIGHTING SYSTEM							
Basic Light	**2**	**5**	**31**	**50**	**59**	**0.82**	**1**
Specific Light	**5**	**7**	**36**	**48**	**51**	**0.78**	**2**
A16. FACILITIES & DECORATION SYSTEM							
Other decorative sculptures, decorative signs, and greening	**4**	**6**	**30**	**46**	**61**	**0.81**	**1**
Humanized facilities	**6**	**5**	**27**	**57**	**52**	**0.80**	**2**
Landscape Furnitures	**6**	**6**	**38**	**38**	**59**	**0.79**	**3**

Residents for A10 The evaluation of landscape function & space shows that they are most satisfied with rank one central landscape (RII = 0.80), rank two entry area (RII = 0.78), and platform area ranks the lowest (RII = 0.74).

Residents to A11 the evaluation of landscape elements, there were three ranks 1 (RII = 0.79), namely entry identification, swing pool, and square. The most dissatisfied are rank eight function lawn (RII = 0.71).

Respondents' response to A13 the evaluation of the payment system, the two items pavement material, and safety of pavement, were balanced (RII = 0.76).

A14 was the satisfaction evaluation focusing on the green system, in which green space and grass (RII = 0.79) is rank 1, and the green system element that residents were most dissatisfied with was rank four shrub (RII = 0.73). Rank 1 of the lighting system was primary light (RII = 0.82), and Rank 2 was specific light (RII = 0.78) in A15.

A16 was the satisfaction evaluation of landscape facilities & decoration system. Rank 1 is other decorative achievements, decorative signs, and greening (RII = 0.81), Rank 2 refers to humanized facilities (RII = 0.80), and the last rank is landscape furniture (RII = 0.79).

4.3.4 Section D: Landscape Quality Expectation (RO2)

Table 4. 29： Landscape quality expectation

Items	Strongly Dissatisfied	Unsatisfactory	Normal	Satisfactory	Strongly Satisfied	RII (∑W/A*N)	Rank
A17. QUALITY EXPECTATION							
Landscape Maintenance Management Quality	3	7	46	43	48	0.77	1
Landscape Design Quality	10	3	47	34	53	0.76	2
Landscape Ancillary facilities Quality	8	4	42	55	38	0.75	3
Landscape Civil Engineering Quality	7	6	55	41	38	0.73	4

According to the evaluation data of residents' expectations for landscape quality, residents were most satisfied with landscape maintenance management quality (RII = 0.77) and landscape design quality (RII = 0.76). The worst dissatisfaction was landscape civil engineering quality (RII = 0.73).

4.4 Findings of Questionnaire B

Questionnaire B also is related to RO2 (To identify the factor influences of the quality management of China's real estate landscape projects), but the respondents in Questionnaire B were mainly potential buyers. The target distribution responses of questionnaire B were the potential buyers of phase II of project A which is still constructing. A total of 232 questionnaires were distributed, and the number of valid questionnaires received was 114. The response rate was 49.1% (Table 4.29). Questionnaire B was designed in the form of multiple-choice. However, the items of Questionnaire B correspond to Questionnaire A, which were also divided into four sections, the basic information of respondents, the needs of landscape characteristics, the needs of landscape design and engineering, and other expectations (Appendix B).

4.4.1 Section A: Basic Information of Potential Customers

Table 4. 30： Basic information of respondents of Questionnaire B

Items	No of respondents * Total Respondents: 114	Percentage (%)	Rank
B1. GENDER			
Male	53	46.49	2
Female	61	53.51	1
B2. AGE			
Youth (19-45)	106	92.98	1
Middle Age (46-69)	7	6.14	2
Aged (Above 69)	1	0.88	3
B3. TIME IN HOME			
Weekend	31	17.42	2
All-day	29	16.29	3
Morning	12	6.74	4
Afternoon	7	3.93	5
Night	99	55.62	1
B4. HOUSEHOLDS			

One	16	14.04	3
Two	17	14.91	2
Three and above	81	71.05	1
B5. ELDERLY PERSONS			
Yes	49	42.98	2
Not	65	57.02	1
B6. PREGNANT MOTHERS & CHILDREN			
Yes	27	23.68	2
Not	87	76.32	1

According to the background information data of potential customers, there were more women (53.51%) than men. The age range of house buyers was the youth, accounting for 92.98%, followed by middle age, 6.14%. There was only one older adult (0.88%). The residence time of potential customers in the residential area was mainly in the evening, accounting for 55.62%, followed by 17.42% on weekends. Eighty-one respondents have three or more family members, accounting for 71.05%. 42.98% of the respondents had older people at home, and 57.02% had no older adults. Only 23.68% of the respondents had pregnant women and children at home, and 76.32% had no pregnant women and children.

4.4.2 Section B: Demands of Landscape Characteristics (RO2)

Table 4. 31: Demands of landscape characteristics

Items	**No of respondents * Total Respondents: 147**	**Percentage (%)**	Rank
B7. LANDSCAPE FEATURE / CHARACTERISTICS			
Convenience	106	92.98	1
Health & Safety	97	85.09	2
Comfort	88	77.19	3
Ecology	71	62.28	4
Landscape Value	61	53.51	5

Practicability, Applicability or Usability	58	50.88	6
Humanitarian	58	50.88	6
Participatory & Interactive	54	47.37	7
Sense of belonging	54	47.37	7
A sense of privacy	46	40.35	8
Artistry	44	38.60	9
Education	39	34.21	10
Ornamental	36	31.58	11
Creativity	35	30.70	12
Sociality	31	27.19	13
Sense of science and technology	29	25.44	14
Sense of quality and dignity	26	22.81	15
Flexibility	25	21.93	16
Multi-function	22	19.30	17
Other	1	0.88	18

B7 required potential customers to choose the landscape characteristics they cared about when buying a house. The first was the convention, accounting for 92.98%, the second was health and safety, accounting for 85.09%, and 88 respondents chose comfort, which accounted for 77.19%, rank 3. One respondent proposed a sense of warmth in the last other items, accounting for 0.88%. The second to last was multi-function (19.30%).

4.4.3 Section C: Demands of Landscape Design & Civil Engineering (RO2)

Table 4. 32：Demands of landscape design & civil engineering

Items	No of respondents * Total Respondents: 147	Percentage (%)	Rank
B8. MOST IMPORTANT/ HIGHEST EXPECTATION LANDSCAPE ELEMENT			
Entrance and Exit	80	70.18	1
Road	79	69.30	2
Main Lobby Landscape	69	60.53	3

Activity Site	69	60.53	3
Central Landscape	62	54.39	4
Waterscape	62	54.39	4
Humanized Facilities	61	53.51	5
Fitness Venues	56	49.12	6
Court	51	44.74	7
Pet Place	41	35.96	8
Swimming Pool	40	35.09	8
Tree Pool / Seat	35	30.70	9
Plastic Runway	33	28.95	10
Flower Rack / Pavilion	29	25.44	11
Square	26	22.81	12
Overhead Floor	24	21.05	13
Landscape Wall	13	11.40	14
Outdoor Club	11	9.65	15
Outdoor Living Room and Stage	9	7.89	16
Arch	7	6.14	17
Other	1	0.88	18
B9. LANDSCAPE CIVIL ENGINEERING YOU CARE			
Transportation System	98	85.96	1
Greening System	84	73.68	2
Pavement System	75	65.79	3
Lighting System	74	64.91	4
Other / Supplementary / Explanation	1	0.88	5
B10. MOST IMPORTANT FUNCTIONAL SPACE			
Motion Space	77	67.54	1
Leisure Rest Space	73	64.04	2
Entertainment Space	65	57.02	3
Parent & Child Activities Space	59	51.75	4
Pet Space	55	48.25	5
Viewing Space	54	47.37	6
Green Space	50	43.86	7
Reading Space	49	42.98	8
Community Activities Space	46	40.35	9

Rapid Access	45	39.47	10
Activities Space for The Elderly	45	39.47	11
Neighbour Communication Space	43	37.72	12
Meditation Space	39	34.21	13
Luxury Place	32	28.07	14
Mother-Infant Space	19	16.67	15
Others	0	0.00	/

B8 was to investigate the expectations of potential home buyers for landscape elements in their dream residential area, the highest expectations of respondents were entrance and Road. The last one was others, one respondent proposed medical facilities, and the penultimate seven respondents chose arch, accounting for 6.14%.

B9 was the expectation for the quality of landscape engineering. The transportation system has the most significant number of people to choose from, accounting for 85.96%, followed by the greening system, accounting for 73.68%.

B10 was to ask potential customers to choose the residential landscape function and space they expect the most. Motion space ranks 1, accounting for 67.54%, and leisure rest space ranks No.2, accounting for 64.04%. The two least expected space places were mother-infant space (rank 15, 16.67%) and luxury (rank 14, 28.07%).

4.4.4 Section D: Landscape quality expectation (RO2)

Table 4. 33: Landscape quality expectation

Items	No of respondents * Total Respondents: 147	Percentage (%)	Rank
B11. IS LANDSCAPE THE FACTOR CONSIDER WHEN BUYING A HOUSE?			
Yes	109	95.61	1
Not	5	4.39	2
Other	0	0.00	/

B12. CAN THE QUALITY OF LANDSCAPE IMPROVE YOUR QUALITY OF LIFE?			
Yes	112	98.25	1
Not	2	1.75	2
Other	0	0.00	/
B13. EXPECTATIONS FOR LANDSCAPE QUALITY			
Level 1: The community is just a fundamental place to pass and walk	10	8.77	5
Level 2: the community environment is clean, safe, healthy, and environmentally friendly	36	31.58	1
Level 3: the community can let you make like-minded friends or improve your image	17	14.91	4
Level 4: you pay more attention to the overall brand value, image, and artistic feeling of the community	29	25.44	2
Level 5: the community landscape should be the highest embodiment of your understanding of the environment and can help you realize the value of life	22	19.30	3

According to the data of B11, 95.61% of the respondents choose yes, which means that landscape (quality) was the factor that house buyers consider when buying a house. In B12, 98.25% of respondents believed that landscape quality could improve their quality of life. In B13, the customers were required to judge the hierarchical theory of needs (Maslow, 1943) of landscape quality, the highest-ranking was level 2 selected by 36 respondents, accounting for 31.58%, and the lowest was level 1 accounting for 8.77%.

CHAPTER 5 DISCUSSION

5.1 Introduction

Chapter two literature review identified that customer demand was one influencing factor of landscape project quality management, which already had been confirmed by Chapter four Theme 6 of the interview. The nine interviewees suggested investigating customer demand to improve project quality management. Therefore, this chapter mainly discusses the data, findings, and discussion of Questionnaire A & B, which also involved the response rate, acceptability, validity, and reliability of the questionnaire, the design basis and logic of the questionnaire, Questionnaire references, and the contribution of the questionnaire to the research results.

5.2 Discussion of Interview

5.2.1 Part B: Exploring the Challenges for Landscape Quality Management (RO1)

The answer of interviewees to research question 1 (What are the quality management problems of Chinese real estate landscape projects?) was verified through Interview Part B composed of four themes and helped this study achieve Research Objective 1 of this study which is to explore the challenges in the quality management of China's real estate landscape projects.

Table 5. 1: The interview's discussion corresponds to the RO

PART	RESEARCH OBJECTIVE	THEME	TOPIC		QUESTIONS
Part B Challenges for Quality Management	**RO1.** To explore the challenges in the quality management of China's real estate landscape projects	Theme 1	Challenge 1	Lack of mature theoretical support	C1 – C3
		Theme 2	Challenge 2	Shortage of Quality Management Knowledge	C4 – C6
		Theme 3	Challenge 3	Excessive Intervention by the Design Department in Project Management	C7 - C9
		Theme 4	Challenge 4	The difficulty of promoting information system management	C10 – C15

5.2.1.1 Theme 1 Validated Challenge 1 - Lack of Mature Theoretical Support

Theme 1 validated one of the four challenges of Chinese real estate landscape quality management mentioned in the Chapter 2 literature review, which lacked mature project management theory.

Table 4.3 of C1 confirmed Miao (2018) that the large scale of China's real estate industry and the considerable workload of practitioners were the reasons for the detailed division of work scope of real estate industry practitioners, and Chen (2020) further demonstrated that the detailed division of work scope was the main reason why employees cannot participate in the whole life cycle of the project and lack project management experience. I7 encouraged solving this problem by increasing member participation, project management training, brainstorming, disclosure meeting, etc.

C2 demonstrated that most practitioners only have limited knowledge and understanding of project management (Table 4.4 & Table 4.5), which is consistent with the finding from Wu（2017）that project management knowledge was still fresh in China's real estate industry, the practitioners generally did not have a scientific, systematic, and standardized understanding of project management knowledge. The

organization provided limited employee project management knowledge training (Xie, 2020).

C3 tend to support Zhang & Zhou (2011)'s finding that it was not the best method to apply foreign project management knowledge directly to China real estate, due to there was no actual management experience in China to support the foreign project management theory, which might lead to inappropriate management decisions (Table 4.5). In addition, the research results of Yu & Lin (2020) encouraged China real estate practitioners to learn and understand more project management knowledge and apply it to their daily work, which was the primary solution for China real estate practitioners' response to the current quality management challenge. It can also provide empirical support and verification for project management theory to promote the development of real estate project management development in China.

5.2.1.2 Theme 2 Validated Challenge 2 - Shortage of Quality Management Knowledge

Theme 2 verified the second challenge of Chinese real estate landscape quality management, that is, Zhu (2009) stated that Chinese real estate practitioners have negligible knowledge and understanding of total quality management and quality management system, which was an obstacle for the real estate industry to promote and implement the quality management, and Only I6 of the nine interviewers said that "*A little bit understanding of quality management, but no systematic learning and understanding about the QMS.*"

According to C5's answer data, nine interviewees have quality management awareness. However, they all frankly indicated their lack of quality management knowledge, and they also uniformly expressed that the "quality management" they carry out in their daily work only meets the minimum quality needs, that is, the work without mistakes.

The above findings proved the finding proposed by Zhu (2009) that the interest expectation of stakeholders in real estate projects leads to understanding deviation, which harms project quality. Xie (2020) added that even today, with the rapid development of information in China, establishing a real estate quality management system is still in the level stage.

Table 4.6 demonstrated that the quality of the real estate landscape project directly reflects the product quality, and the structural details of landscape elements directly affect the brand value for customers, which validated Sun (2020)'s research conclusion that landscape engineering was a quality evaluation index of China real estate project at the delivery stage. Moreover, the statement of I6 also explained Sun (2020)'s view, that is, "*Enough attention and management are needed. For example, the construction quality, small edge trimming, and different material texture are enough to affect the accuracy and quality sense of the whole project.*"

5.2.1.3 Theme 3 Validated Challenge 3 - Excessive Intervention by the Design Department in Project Management

The three questions of Theme 3 verified that the exceptional intervention by the design department in project management is the third challenge of China's real estate landscape quality management; that is, the landscape design has an extraordinary intervention and influences the overall project (I7). The above statement also proved the opinion of Yi (2014) that the design department was dominated by technicians with limited project management experience, which increased numerous inappropriate and even wrong management decisions to affect real estate product quality. Ren (2020) agreed with the above view and further showed that the design department's management would increase ineffective communication. In addition, the research conclusion of Miao (2018) also indicated that the management mode dominated by the design department could

affect the management efficiency and employees' spiritual internal friction, affect work performance, and lead to low project quality management.

The answer of C7 (Table 4.7) confirmed the research conclusion of Sun (2020), the work contained in the landscape design stage was closely related to that in the construction stage. The work in these two stages was the most fundamental factor determining the quality of real estate projects (Yu & Lin, 2020). Assuming the design result quality can satisfy customer expectations, it can increase sales performance (I9) (Sun, 2019), and the critical factor to the quality of design results lies in the construction quality (I7). C8 and C9 verified that the landscape project in these two stages was most likely to cause a chain reaction of project quality problems; that is, the contradiction between the designer and the constructor is the responsibility of both parties. The designer's problem lies in the lack of engagement in construction site management and ineffective communication with the constructor, while the constructor's problem is mainly reflected in three aspects: qualification, professional ability, and refusing communication (I7). Sun & Hou (2016) also stated that the designer's lack of construction site management experience and less participation in the construction site affect landscape engineering quality and supplier quality, especially the materials. The above findings also confirmed the conclusion of Yang (2014), the management mode of the designer was usually divorced from practical problems, and there were too many remote interventions on construction problems they did not understand (I8 in Theme 2 C8) (Table 4.8), which usually increases the cooperative attitude of the constructor who was unwilling to communicate, that is, employee energy consumption mentioned by Miao (2018).

However, the conclusion of Dong (2015) in Chapter 2 literature review was not verified in the interview. Nine interviewees did not mention the "*Wolf culture*" of the enterprise and the relationship between employee turnover rate and landscape quality.

5.2.1.4 Theme 4 Validated Challenge 4 - The Difficulty of Promoting Information System Management

Firstly, C10 verified Miao (2018) stated that although the China real estate industry has implemented BIM for a long time, it still has not broken through the development bottleneck (Table 4.10). So far, the interviewees limited know the function and value of BIM; they know that BIM can improve the efficiency of project quality management, schedule management, cost management, and risk management (I3, I4, I5, I6, I7 &I9). Wang, J., (2014) also mentioned seven respondents' answers（I1, I2, I3, I6, I7, I8 & I9）in C12 also confirmed Wang, J., (2014) ‘s finding that the main reason why difficult to promote BIM development in China real estate industry is due to the high cost of learning and use. Facts have proved that the use of information system tools in China's real estate industry is less than other countries, and it was not easy to implement it in the short term; Therefore, It seems more important to improve the traditional management tools that current Chinese real estate practitioners are good at using than to invest much cost to implement new management tools (Xie, 2020). In addition, most Interviewees in C11 answered that they were better at and more suitable for using traditional tools, such as lists and excel (Table 4.11). The above statement verified the finding of Sun & Hou (2016), traditional management tools can cope with less responsible work and are easy to operate. Wu (2017)'s research conclusion explained why practitioners prefer to use traditional tools: although the volume of Chinese real estate projects was always considerable, due to a large number of employees and huge workload, the division of work scope of Chinese real estate practitioners was detailed. This detailed division of work scope of labor accelerates practitioners to complete their work and reduce the complexity of work tasks.

The findings of C14 and C15 double verified the four challenges of China's real estate landscape quality management. All the interviewees strongly agreed with these four challenges from this study's chapter 2 literature review in C15. Some of the interviewees added that some other challenges that affect the quality management t of the Chinese real estate landscape be summarized into the four challenges found in this study. For example, insufficient on-site management participation and poor communication (I3, I7 & I8) (Wu, 2017) can be summarized in challenge three, and the mutual constraints of the construction schedule, cost, and quality (I2, I4, I6, I7 & I8) (Yu, 2020) can be summarized in Challenge two.

5.2.2 Part C: The Influencing Factors in Landscape Quality Management (RO2)

Part C Related Research Objective 2 (To identify the influencing factors of the quality management of China's real estate landscape projects). discussed Research Question 2 (What are the key points of quality management concerned by different stakeholders of Chinese real estate landscape projects?) (Table 5.2)

Table 5. 2: The interview's Part C discussion corresponds to the RO2

Part C Influencing factors of Quality Management	**RO2**. To identify the factor influences of the quality management of China's real estate landscape projects	Theme 5	Factor 1	The factor of Poor-Quality Management in Landscape Project Planning	C16 – C21
		Theme 6	Factor 2	The factor of Quality Management in Satisfying Customer Demands	C22 – C29

Exploring the four challenges of quality management in China's real estate projects and conquering them should be the common goal of all employees in China's real estate industry. Therefore, identifying the essential influencing factors of Chinese real estate

landscape quality management can help practitioners overcome the difficulties of customer service quality management. Theme 5 discussed the impact of poor-quality management on project quality in the planning stage, which involves the contradiction between stakeholders. Theme 6 discussed the relationship between customer needs and landscape project quality.

5.2.2.1 Theme 5 Validated Factor 1 - The Poor-Quality Management in Landscape Project Planning

C16 in Theme 5 verified Li & Zhu (2021)'s findings, the first was that the impact of landscape quality on product value mainly affects the satisfaction of residents, and secondly, landscape quality has a positive impact on improving the project price and customers' purchase desire, which also confirmed the opinion "*The High-quality landscape has more commercial value*" from research conclusion of Yu (2020) and Hussain, Tukiman & Zen (2014) (Table 4.12).

The data results of C17 and C18 confirmed Guo & Xiong's (2014) research results that the main reason Chinese developers began to pay attention to landscape quality was the increase in customer demand with the Chinese real estate development high-speed process. At the same time, it also verified the research conclusions and views of Wu (2017) and Miao (2018); China developers have identified a large number of quality risks in the project planning stage. However, to obtain much organized economic benefits, these developers usually ignored the project quality risks and kept going on with the development model of high turnover.

The qualitative data results in C19 and C20 demonstrated that the risks of quality or quality problem of the project itself were the most directs objective factor for the quality of landscape project, such as construction technology, construction process, the working attitude of the construction workers & the qualification of the construction party (Ding,

2015) (Table 4.14). Among them, Sun (2020) confirmed that the qualification of the construction party was usually the most fundamental factor affecting the customer's satisfaction evaluation of landscape quality. The construction party with excellent and high requirements usually has better working performance.

The statements and opinions of nine interviewees in C21 validated the conclusions of Cai (2018) (Table 4.14); that is, most of the significant quality accidents of the project occur in the landscape construction stage. The material quality problem was the primary factor of landscape project quality, followed by the understanding deviation caused by the ineffective communication between the stakeholders, especially the design department and construction department, and design department and customer demands.

5.2.2.2 Theme 6 Validated Factor 2 & Supported Questionnaires - Customer Demands

Theme 6 confirmed the similar research conclusions of Yin (2014), Wei (2017), and Chen (2020), that is, although the real estate landscape project, as a part of the developer's products, cannot be sold independently, the landscape still was an important factor affecting the real estate product price and sales (Hussain, Tukiman & Zen, 2014) due to the target source of developers' economic benefits can be achieved mainly through customer purchase (Wei, 2017).

The results of C22 confirmed the conclusion of Guo & Xiong (2014) that the customer's demand provides the basic requirements for the construction of real estate projects (Table 4.16).

C23 validated Li & Zhu (2021) stated that Landscape ancillary facilities and greening system provide convenience and healthy environment for residents in the residential landscape environment, respectively.

C24 shows that the accuracy of project positioning has a very close positive relationship with the customer complaint rate. The accurate identification of target customers can increase house sales to appropriate customers and reduce the risk of customer complaints, and Chen (2020) also said that accurate target customer identification could speed up the sales of products.

Table x of C25 and C26 verified Ding (2015) and Chen (2020)’s findings that the position of landscape in China real estate industry is approaching an essential position from the edge of the end of the workflow of a construction project due to the increase of customers' demand and higher customer’s expectation for landscape projects than before. Therefore, customer needs need to be researched in detail.

The findings of C27 was the customer's psychological feelings, design drawing quality, landscape engineering quality, and landscape element quality that the interviewee suggested being discussed and surveyed more than exploring the quality itself or poor quality management planning in this study, this means that setting items for landscape characteristics, landscape functions and spaces, landscape elements, and landscape engineering in questionnaire design, and which was similar to the categories designed by 16 former scholars in Table 4.21 on the questionnaire on environmental or landscape satisfaction of residential area.

C28 and C29 confirmed the research finding of Yu (2020), and customers' needs were imperceptibly changing the design quality and engineering quality of landscape in China real estate industry. In order to meet higher customer needs, the developer should improve the work accuracy in the project planning stage to avoid exposing bad quality problems in the construction stage, which was also the view of He (2020) in Chapter 2, such as target customer identification and project positioning (Guo & Xiong, 2014). Compared with the management of the construction party, the customer's demand

variable was more uncertain, so the attention to fulfill the customer's demand should be greater than the project quality itself (Yu, 2019; Ren, 2020).

5.2.3 Part D: Explored A Quality Management Tool of Country Garden Group (RO3)

Research Question 3 (How to improve the quality management tools of China's real estate landscape projects?) was to determine whether and how the quality management tools used by current Chinese real estate industry practitioners can be improved, which related to Theme 7, and there were ten discussion questions about the quality management tools currently used by practitioners in China's real estate landscape industry.

5.2.3.1 Theme 7's Discussion

It has been verified in the previous Theme 4 C11 that most of China's real estate practitioners prefer to use traditional tools, checklists, and excel check forms (Sun & Hou, 2016). Neither employers nor employees were willing to spend on new tools for complex and challenging information system tools (BIM) with high learning costs. Theme 1 has verified that Chinese real estate landscape practitioners generally have a limited understanding of project management knowledge. Theme 2 already confirmed the statement that China real estate practitioners usually lack quality management knowledge (Xie, 2020; Sun, 2020). Furthermore, Theme 4 discussed results means promoting the information system tool needs a long-term effort with uncertainty, but the traditional tools that China real estate practitioners are good at using now are the focused item worthy of studying the improvement methods (Xie, 2020).

Therefore, Theme 7 mainly discusses the management tool checklist tool currently used in the interviewees' organizations, which also verified the conclusion of Yan (2016) and

Sun & Hou (2016), the checklist tool is top-rated and commonly used among Chinese real estate practitioners.

C30 - C33 confirmed the research conclusions or statements of Yan (2016). The Task statement/ Design specification is a tool to ensure that the design quality (master plan, construction CAD drawing, structure drawing, etc.) meets the organization's basic requirements. Nine interviewees from C31 and C32 explained the reasons why the task statement can ensure the minimum quality requirements that is the designer has a general understanding of the basic information of the project, developer requirements, design content requirements, estimated cost, work disclosure, acceptance framework, communication certificates, and customer needs. Furthermore, C30-C32 also confirmed that Yu (2020) stated that the responsible party could be found from the task statement when the cause of the accident needs to be investigated due to quality problems in the project construction.

The finding of C33 shows that current China real estate practitioners affirm the essential functions of the task statement. However, they all believe that the task statement should be appropriately updated and improved in combination with precise customer needs, such as increasing the surrounding conditions of the project, increasing the detailed guidance of design requirements, increasing the description of the management process, and the essential requirement of customer. The above finding is partly consistent with the conclusion of Yu (2020), but He (2020) believed that too long length and content task statement makes the reader feel irritable. I3 also indicated that the designer might not read too many words thoroughly. Moreover, I5 added that "*the subjective consciousness of the task statement is too strong to adjust the information according to the actual situation and customer demands research.*"

C34 and C35 confirmed that the task statement in the Country Garden Group or China real estate industry needs to be updated and proposed the direction of improvement should be done first, which can avoid the conflict between customer requirements and design. Interviewees stated that the problem could be solved by updating the task statement, such as regularly conducting customer research and updating the customer requirements column. The second is the detailed quality evaluation of each workflow.

C36 and C37 discussed that the conflicts among the stakeholders were the key factors affecting the quality of real estate products, and the main causes of these conflicts were ineffective communication, such as inaccurate and untimely information transmission. C36 and C37 also validated Chen (2020)'s the discussion that there were more or fewer information barriers between practitioners and customers, between design and construction, and between developers and third parties. The above statement also verified Xie (2020)'s research results that the participants of real estate projects are independent in the division of labor; they were usually only good at completing their work and did not think with the organization's objectives and the needs of the project, which can bring many communication problems and lead to contradictions and project quality deviation. I7 in C36 mentioned that "*Retaining relevant telephone recordings and text records" can ensure the effectiveness of communication, reduce misunderstandings and ensure the quality of the project.*" Therefore, the use of task statements can help the staff of each department have a specific understanding of the whole project and reduce the risk of inaccurate information transmission.

C38 verified the conclusion that it is too tricky for Theme 4 to implement an information system in China's real estate industry once again. Also, it verified the improvement suggestions task statement in C33. and C38 also proved Yan's (2016) view that improving management ability and management tools was more suitable for the current development model and speed of China's real estate, and there was still a

long road and challenges to breakthrough in the implementation of the new information system.

C39 and C40 confirmed that accurate customer demand data (I1) (Guo & Xiong, 2014), management deviation (I5 & I7), enhanced design quality (Cai, 2020), strict control process (Ding, 2015), cost and schedule, effective communication and record-keeping (I7) (Yu, 2020). I7 emphasized that "*The quality results deviate because the process deviates.*" I1 stated that the evaluation and investigation of the qualifications of the construction party and suppliers could ensure the quality of the landscape project.

5.3 Discussion of Questionnaire A (RO2)

This section mainly discussed Factor 2. Customer Demand related to RO2 and mainly discussed the quality demands of residents.

5.3.1 Section B: Evaluation of Landscape Characteristics

According to A7's finding the satisfaction evaluation on convenience, auxiliary services facilities, traffic convention, and pedestrian rank the top three, which verified the research of Ding (2015), the convenience facilities of residential landscape highlighted the developers' understanding of humanization concept and environmental sustainability, and also improve the residents' evaluation of landscape comfort, To improve the satisfaction of landscape project quality. In addition, in response to interview Theme 6 (IF2) C23, I2 said that auxiliary services facilities were often complained about by customers. However, the lowest satisfaction for convenience was suitability for people of all ages, indicating that most of the owner lacks a suitable functional landscape place in the residential area, which verified Li & Zhu's (2021) statement that the unbalanced landscape function affects the landscape quality and reduce the positive feelings of residents.

Among the A8 Health & Safety characteristics, the pedestrian system separated from vehicle system has the highest satisfaction, which can confirm the research conclusion of Shang (2006) that the traffic system has the most significant impact on the landscape quality, furthermore the research results of Wu et al. (2021) shown that poor residential transportation system might reduce customers' expectation and satisfaction with the landscape, thus affecting customers' evaluation of landscape quality. The second-ranked epidemic prevention in A8 validated Ren's (2020) finding, and epidemic prevention was a new landscape demand updated in China's real estate landscape industry due to covid-19. The logistics system has the lowest satisfaction, followed by the security system in A8, which was due to the designer's design vision and objective when designing a project phase I were an open and experiential landscape concept.

Among the satisfaction evaluation of other landscape characteristics in A9, the satisfaction of ecology, practicality/ applicability/ usability, and participant & interactive were the highest top one, which proved that the environmental quality of the project could increase the residence time of residents (Ding, 2015), which also validated the research conclusion of Li & Zhu (2021), the high-quality living environment can improve the well-being of residents, and determines how often residents use landscape space and facilities. The three lowest satisfaction landscape characteristics of residents in A9 were creativity, landscape value, and artistry. This was means that although A project was the first project of Country Garden Group that broke through the requirements of standardized design and standardized quality at that time, it was not innovative enough for customers. The above statement was consistent with the deviation between design and customer requirements (I1, I6, I7, I8,); the deviation between design and construction (I1, I4, i5, i7); and the deviation of project positioning (I1, I5, I6) discussed in C7, C21, and C24 in the interview respectively, which

eventually leads to the inconsistency between the customer's demand for creativity and the understanding of landscape practitioners (Ding, 2015).

5.3.2 Section C: Evaluation of Landscape Design & Civil Engineering

In Table of A10, the central landscape and entrance area has the highest satisfaction in landscape function and space item which verified Chen (2020) stated that the central landscape reflects the quality of real estate projects, and the entrance area expected by residents usually have a high degree of connection with the transportation system, which can directly determine the owner's satisfaction with the overall landscape (Wu et al., 2021). The reason for the low satisfaction of the platform was that there was a too large scale of green areas that cannot be trampled, which cannot meet part of residents' demands. The lowest satisfaction for suitability for people of all ages in the convenience evaluation results in A7 also proved that the quality of landscape design did not meet the needs of people of all ages. The above two pieces of evidence double validated Li & Zhu's (2021) finding that unbalanced landscape function leads to low-quality satisfaction.

A11 verified the research results of Wu et al. (2021); the entrance identification was the logo of the residential area, which is the most direct landscape element that can reflect the grade of the real estate project. The swimming Pool's satisfaction date confirmed Chen (2012) stated that the landscaped swimming pool is one of the premium factors of real estate projects. Function lawn and Pet space with the worst satisfaction in A11indicated that the designer designed too many shrubs, which leads to the lack of trampling lawn and pet playing space. The research conclusions of Yu (2020) and Xu (2020) can be used as a supplement and explanation to the above verification; customers' demand for landscape is satisfied with primary residence and passage and

higher material and spiritual pursuit. In addition, I7 also emphasized that "*the demand of current customers was increasing compared with past customers*" in interview C26.

The results of A13 shown that pavement was not one of the main factors considered by the residents, but one of the elements for practitioners to ensure landscape quality, which was consistent with I7's opinion mentioned in Theme 1 C2 that "*Strictly control the load requirements of materials, including pavement, landscape sketch, plants, and structural structure according to the drawings, meet the quality acceptance standards, and strive to ensure the structural safety under the condition of achieving the effect of the scheme.*" In addition, the statement also proved the view emphasized by Ren & Jiang (2010) that the difficulty of quality management in China real estate lies in the engineering stage of the project.

The most satisfying part of A14 is evaluating green space and lawn quality, and the most dissatisfying part is the shrub. The finding attributed to the design quality of the landscape, which also related to the previous discussion of A11 and A10, there were too many shrubs, resulting in the insufficient number of lawns; and there are too many shrubs and fewer platforms or movable lawns. The above results further confirmed that the understanding deviation between stakeholders was directly proportional to the quality of landscape projects (Chen, 2020). Also, they verified the statements of Yu (2019) and Ren (2020) that landscape project practitioners' understanding of current customer needs was weakening, that is, the conflict between design and requirements. I4 Theme 6 C22 mentioned that collecting customer needs in advance can ensure the landscape quality. C28's result confirmed that practitioners also believe that customer needs have a more significant impact on the quality management of landscape projects than the quality problems and risks (I3 I4 I5 & I6).

The results of A15 shown that the reason why customers care about the essential lighting was that most respondents stay in the residential area at night, which means that they are usually office workers with serious overtime, which validated identifying the target customer is the vital process in quality management (Xie, 2020). The results of A16 demonstrated that customers were more satisfied with decorative landscape structures than humanized facilities and landscape furniture, which contradicts the previous data results of artistry satisfaction with A9 landscape characteristics (the penultimate dissatisfaction). The contradiction might be due to the customer's lack of understanding of landscape design terminology. However, the contradiction between A9 and A16 also can prove that Effective communication can ensure project quality.

5.3.3 Section D: Landscape Quality Expectation

The results of A17 validated Sun (2020) demonstrated that landscape design quality and landscape engineering quality do not end with landscape project delivery.

Maintenance management is also the process of landscape quality management and determines customer satisfaction to a great extent. I5's statement in Theme 6 C22 added that "*the customer's demand was the landscape we most want to see*," which also confirmed that landscape quality management needs continuous summary and analysis to improve the sensitivity of landscape industry practitioners to landscape quality management (Yu, 2020).

Maintenance management was also the process of landscape quality management and determines customer satisfaction to a great extent. I5's statement in theme 6 C22 complements the customer's demand, that is, the landscape we most want to see, which also confirms that landscape quality management needs continuous summary and analysis to improve the sensitivity of landscape industry practitioners to landscape quality management (Yu, 2020). Due to landscape maintenance management was

usually an independent management organization outside the stakeholders related to other project construction, such as developers, constructors, and designers, this is not the research scope of this study. The focus of this study was the design quality of Chinese real estate landscape projects, followed by the quality of landscape projects. Therefore, landscape maintenance can provide research direction for future researchers.

5.4 Discussion of Questionnaire B (RO2)

This section mainly discussed Factor 2. Customer Demand related to RO2 and mainly discussed the quality expectation of potential customers.

5.4.1 Section B: Demands of Landscape Characteristics

Table of B7 showed potential customers' demand for landscape characteristics; the five most essential points are convention, health & safety, comfort, ecology, and landscape value that verified the research finding of Li & Zhu (2021), which was the critical factors affecting residents' subjective well-being were service facilities, landscape value, comfortable neighborhood relations and convenient social activities, ecology and Health & safety.

However, Ding (2015) stated that the design goals pursued by landscape designers in their actual work are creativity, sense of quality and dignity, flexibility, and multi-function of landscape (Ding, 2015). However, these landscape characteristics were ranked 12, rank 15, rank 16, and rank 17, respectively, in Table of B7. The above findings showed that there was a certain contradiction between practitioners' understanding of the landscape and customers' needs, which was also mentioned in the 2020 report on real estate consumption of Chinese buyers mentioned in Chapter one problem statement of this study that it is unable to meet customers' needs, resulting in a large number of quality problems and disputes in 2020.

5.4.2 Section C: Demands of Landscape Design & Civil Engineering

According to B8's Table, the respondents with the most substantial demand for landscape design elements were entry and exit (Rank 1), road (Rank 2), and main lobby landscape (Rank 3), which was in line with the conclusion of Wu et al. (2021) on the research of the entrance and exit of the residential area. Wu et al. (2021) demonstrated that the entrance and exit of the residential area and the central lobby landscape have traffic functions and are also where the first factor affects the residents' feelings. Then the fourth-ranked activity site, central landscape, and waterscape were the essential elements reflecting the landscape quality of the real estate. In particular, the quality of the central landscape area can usually determine the sales volume of the most prominent house type of the real estate product (Chen, 2020). The arch was the last landscape element to be satisfied, followed by the outdoor living room & stage and outdoor club, which was consistent with the research results of Cai (2018) that was an excessive investment by developers in outdoor space to create a sense of experience for customers increases ineffective cost investment.

The most critical landscape engineering in B9's Table is the transportation system (convenience, health & safety, and comfort mentioned in B7 and the entrance and exit mentioned B8). Moreover, Shang (2006) and Wu et al. (2021) stated in the doctoral thesis that the traffic in the residential area was the main influencing factor of residents' sense of experience. The lighting system has the lowest customer demand in landscape engineering. Hua (2015) explained in his research results on landscape lighting systems that because residential area lighting uses dim, warm light to create a home atmosphere, too bright lighting systems can reduce the sense of privacy and comfort of residents.

In B10, motion, leisure rest, and entertainment spaces have the highest demand for landscape functions. Among them, motion and entertainment spaces were confirmed to

be the most frequently used spaces in residential areas in the research conclusion of residential activity space discussed by Ren (2020). This was also in line with Yu's (2020) definition of landscape space. However, the last landscape function that customers need was proved to be the mother-infant space, which was in line with the customer identification of a project phase II in project planning. The above findings can be verified that the accurate identification of target customers in project planning is the key to the success of real estate projects (Guo & Xiong, 2014), which also confirmed Chen (2020)'s view that the Accurate customer base research by developers can increase the house sales.

5.4.3 Section D: Landscape Quality Expectation

The findings of B11 and B12 validated two research conclusions of Hussain, Tukiman & Zen (2014). First, the quality of landscape design affects the purchase decision of house buyers. Second, a good quality landscape can increase the value of real estate projects (Figure 5.1). B11 and B12 also confirmed the statement of He (2020) on the real estate landscape in Chapter 2. Moreover, the results of C6, C6, C16, C25, and C29 of Theme 6 in the interview of Chapter 4 were highly consistent with questionnaire B.

	Description		Frequency	Percentage %
a.	Landscape design influences decision to buy or rent a house	Missing	16	1.6
		Yes	682	68.2
		No	302	30.2
		Total	1000	100.0
b.	Providing good landscape increases the value of property	Missing	13	1.3
		Yes	904	90.4
		No	83	8.3
		Total	1000	100.0

Figure 5. 1: Research Results of owning a dream-house from Hussain, Tukiman & Zen (2014)

B13 refers to the hierarchical theory of needs (Maslow, 1943); the results of B13 verified the statement of Ren (2020) and Xu (2020) that the customer demand for the Chinese real estate landscape is increasing. Moreover, I7 stated the previous generation considered more basic housing needs and had more minor needs and expectations for landscape and environment, while the current generation considered more the value that landscape can bring (Theme 6 C26). In his doctoral thesis, Yu Yang (2020) demonstrated that landscape quality was an essential part of real estate projects, which was of great significance to improve product value and increase residents' happiness.

CHAPTER 6 CONCLUSION AND RECOMMENDATION

6.1 Introduction

This is the last chapter of this study. The focus of this study is to propose appropriate suggestions on the development of China's real estate landscape project quality management and improving the current quality management tools to help the practitioners understand the knowledge of quality management and improve the quality standards of china real estate landscape industry. This chapter concludes the study by summarizing the study's overall findings, contribution, and limitations.

6.2 Summary of Overall Research Findings

As the pillar of China's economy, the rapid development of the real estate industry has accelerated the process of urbanization, and the population surge has triggered the demand for housing. Developers obtained substantial economic benefits from house buyers. However, customer demand has changed dramatically. This also means that improving customers' demand for landscape projects was paramount for developers' decision-making.

This study aims to find the development direction of landscape project quality management suitable for China's real estate development and propose practical suggestions for China's real estate landscape practitioners to improve quality management tools.

The research aim of this study is to obtain the following specific research objectives:

i. To explore the challenges in the quality management of China's real estate landscape projects.

ii. To identify the factor influences of the quality management of China's real estate

landscape projects.

iii. To provide suggestions to improve the existing quality management evaluation tool for Chinese real estate landscape projects.

This study found the challenges and influencing factors of China's real estate landscape project quality management through literature reviews and then interviewed nine landscape practitioners of China No.1 Real Estate Developer to verify the correctness of the Chapter Two literature review conclusions in Chapter Five. The interview successively verified the four challenges of China's real estate landscape quality management, the two main influencing factors, and the improvement direction of the current quality management tool. In addition, the opportunities and breakthroughs brought by the challenges, the specific reasons and corresponding solutions of the influencing factors, and the reasons and suggestions for improving the current quality tools were summarized and verified both in the literature and interviews. The interview results validated the solutions and suggestions for finding appropriate quality management methods and objectives for China's real estate landscape industry to improve the industry's quality standard.

Due to the data of literature review and interview showed that customer demand has the most significant impact on real estate landscape quality, this study added survey the quality satisfaction and demands of customers. The target respondents of the questionnaire survey were the customers of project A with the highest landscape quality level of Country Garden Group. The residents in phase I mainly answered Questionnaire A about evaluating the landscape quality satisfaction of A project phase I, while the potential customers (house buyers) in phase II answered Questionnaire B about the needs and expectations for landscape quality. The number of samples sent by the questionnaire could represent all customers of project A (about 2134 people

estimated through the number of building households). The average questionnaire response rate is 48.33%, the KMO value of questionnaire A is 0.925, the P-value is less than 0.05, and the α Value of questionnaire a is 0.898. Therefore the data results of questionnaires A & B were effective and reliable. The questionnaire survey results help to double verify the summary and interview conclusions of the literature review and determine that it was reasonable and valuable to propose suggestions to improve quality management and quality management tools. Figure 6.1 shows how to achieve the three research objectives of this study.

6.3 Conclusion for Research Objectives

6.3.1 Conclusion of Research Objective One

The following were the conclusions obtained from the interview's Theme 1, Theme 2, Theme 3, and Theme 4, which achieved the RO1 (To explore the challenges in the quality management of China's real estate landscape projects).

6.3.1.1 Theme 1 Validated Challenge 1 - Lack of Mature Theoretical Support

Due to the detailed division of work scope and few training opportunities about project management, employees in China's real estate industry were unable to participate in the project life cycle, so they lack mature project management knowledge. Moreover, Chinese developers were good at directly applying mature foreign theories, which was proved invalid because the development theory without practical management experience is not suitable for China's real estate industry. Therefore, it can be solved in the following ways:

- Increasing employee’s engagement in the project life cycle
- Increasing project management training

- Brainstorm regularly to identify project quality risks and opportunities,
- Regular meetings to exchange management experience
- Establishment of a research commissioner

6.3.1.2 Theme 2 Validated Challenge 2 - Shortage of Quality Management Knowledge

Theme 2's conclusion showed that real estate landscape practitioners have quality management awareness but do not have systematic quality management knowledge. Practitioners' cognition of quality management can be reflected in their working attitude. At present, practitioners' cognition of quality management only stays at the level of no error. It is also determined that the understanding deviation caused by poor communication is one of the reasons for the project quality problems. Therefore, to solve this problem, organizations need to carry out actively:

- Quality management training
- Increase stakeholder linkages
- Ensure the effectiveness of communication
- Note the quality management process on the management tools to maintain the sensitivity of quality management
- The control of engineering details is the crucial factor to determine the project quality

6.3.1.3 Theme 3 Validated Challenge 3 - Excessive Intervention by the Design Department in Project Management

Theme 3 confirmed that the design department staff generally lack experience in on-site management. However, the design department has too much authority and can intervene in project decisions. These decisions have a significant impact on the quality of landscape projects. Therefore, it is imperative to solve the contradiction between stakeholders. It can be solved in the following ways:

- Increase the project management knowledge training of the designer and the constructor, and set up a reward and punishment mechanism to encourage and promote quality management
- Increase upstream and downstream disclosure meetings and carry out regular work exchanges to ensure a consistent understanding of the project
- When the designer needs management intervention, it needs to be confirmed by multiple parties
- Improve the communication channels between the construction party and the design party
- The designer shall inspect the project site regularly and record the content and time
- The construction party shall regularly feedback on-site problems and record the content and time
- Set up two-way work attitude evaluation tasks regularly
- Regular quality inspection of materials, plants, and equipment

- Ensure that the quality requirements of each workflow have a positive relationship with customer needs

6.3.1.4 Theme 4 Validated Challenge 4 - The difficulty of promoting information system management

Theme 4 proves that it still took a long time to implement new information system tools in Chinese real estate. Therefore, it is more feasible and operable to improve the tools that practitioners are good at using and help quality management. At the same time, we can refer to the following suggestions to help enterprises gradually reach a higher level of quality management standards:

- Update customer research information regularly
- Setting recruitment requirements
- Setting up reward and punishment system to encourage employees to learn new tools
- Setting up an information system tool team to study new tools and train other employees

6.3.2 Conclusion of Research Objective Two

The following were the conclusions obtained from the interview (Theme 5 and Theme 6) and Questionnaire A & B, which achieved the RO2 (To identify the influencing factors of the quality management of China's real estate landscape projects).

6.3.2.1 Theme 5 Validated Factor 1 - The factor of Poor-Quality Management in Landscape Project Planning

Theme 5 showed that many quality problems in China's real estate projects are due to the developer's choice to ignore the quality risk in the planning stage for higher economic benefits. This development attitude leads to the design team's rapid output of design drawings and the construction party's rapid construction of the project. All stakeholders pursue a high-speed work rhythm but ignore all quality problems that may break out in the construction stage. Therefore, the following suggestions were made:

- In the project planning stage, quality risks shall be considered as much as possible and recorded
- Pay attention to the qualification and construction capacity of the construction party
- Pay attention to supplier qualification and equipment quality

6.3.2.2 Theme 6 Validated Factor 2 & Supported Questionnaires - The factor of Quality Management in Satisfying Customer Demands

Theme 6 verified that customer demands are a quality management factor affecting China's real estate landscape and provided a design basis for the questionnaire of this study, such as investigating landscape characteristics, landscape function and space, landscape elements, and landscape engineering. In terms of convenience, health, and safety in landscape characteristics, real estate project practitioners must fully understand who should regard the project as an entity and comprehensively consider greening, function, space, and other factors. Therefore, the following suggestions can help stakeholders understand customer needs

- Creating customer satisfaction table and customer demand table.
- Conduct regular research on customer satisfaction and customer needs
- Compile the customer's research results into documents that all staff can consult at any time
- In the planning stage, attention should be paid to identifying the risks of customer complaints
- Invite customers to compare and collect feedback data at each stage of the project
- After the project delivery phase, the residents are tracked to obtain information and update the customer demand table
- Landscape practitioners are encouraged to actively participate in product planning, planning and design, and architectural design

Customer demand was the focus of discussion in Research Objective 2, the most critical factor affecting China's real estate landscape quality management. Therefore, this study set up questionnaire a to collect the data of customers' satisfaction with quality management in phase I of project A and questionnaire B to collect the data of buyers' expectations for landscape quality in phase II of project A. By comparing the two questionnaires of customer satisfaction and customer expectation, the following conclusions were drawn:

- In terms of landscape characteristics, residents think more about functions, and buyers think more about the ideal environment. Convenience, health & safety, comfort, and ecology are still landscape features that should be paid attention to in design

- The demand for landscape places has changed dramatically within four years. At present, customers are more concerned about motion space, leisure, rest space, and entertainment space

- The demand for landscape elements is more important than the entrance space. Such as entrance and exit, access signs, main lobby landscape, activity site. Instead of a swimming pool and square

- Today's customers demand a more effective transportation system than green space in the residential area.

6.3.3 Conclusion of Research Objective Three

The following were the conclusions obtained from the interview's Theme 7, which achieved the RO3 (To provide suggestions to improve existing quality management tool for Chinese real estate landscape projects).

6.3.3.1 Theme 7 Explored A Quality Management Tool of Country Garden Group

Theme 7 once again verifies that the implementation of information management tools is not suitable for China's real estate industry, and it is more feasible to improve the existing tools that practitioners are good at using. Therefore, adding the following content can help improve the existing Chinese real estate landscape management tool:

- Detail Basic information of the project

- Developer requirements

- Design content requirements,

- Estimated cost

- Project schedule requirements
- Acceptance framework
- Communication plan
- Customer requirements and updated regularly
- detailed guidance on design requirements
- description of the management process
- The two-way evaluation system for employees

6.4 Limitations

i. Covid-19 has a significant impact on the research methods of this study. The planned face-to-face interview was conducted online, which somewhat affects the expansibility of the respondents' answers. Furthermore, the data collection of the questionnaire had been affected by Covid-19 movement control, and there were few customers with low willingness engagement in questionnaire B in the house sale center of A project phase II.

ii. All interviewers are employees of the landscape design center of Country Garden Group. Two top managers, three designers, two project managers, and two staff of the construction management department. However, one real estate landscape project has investors, structural engineers, hydropower engineers, and others, but they did not participate in this interview. Therefore, the results of this study cannot represent the views of all stakeholders and may be limited to landscape design quality management and part of landscape engineering quality management.

iii. The target respondents of the questionnaire survey on customer needs in research objective 2 were the customers of project A in Guangdong Province, China. Thus, customer needs only represent citizens' expectations in this region for landscape quality and cannot represent the customer needs of other cities in China. Moreover, the discussion of quality tools in research objective three is limited to Country Garden Group because not all organizations use the same quality management tool (task statement/ design specification).

iv. The conclusions and suggestions proposed in this study were based on the summary of the literature review and the nine interviewees of Chinese real estate landscape experts. Due to the subjective interview method, the results of this study were limited to verifying the available information and cannot be proved comprehensive.

6.5 Contribution

i. This study found four main challenges for China's real estate landscape quality management and proposed methods to deal with and break these challenges, which might help real estate practitioners implement a quality management system.

ii. This study identifies two factors affecting quality management, which help current landscape industry practitioners find ideas and methods to solve quality problems, such as improving landscape project planning and updating customer needs in time.

iii. This study provided the research results of customers' demand for landscape quality, which can be used as primary data for the project planning and design stages.

iv. This study proposed improvement suggestions for the quality management tools used by practitioners in the design management center of Country Garden Group, which helps employees improve work efficiency and the quality standard of landscape projects.

6.6 Recommendation for Further Research

The results of Chapter 5, theme 6, C22 validated that project planning, landscape design, landscape engineering, and landscape maintenance management were the four main parts affecting the landscape quality management of Chinese real estate. However, the research scope of this study was the quality of landscape design and landscape engineering. Therefore, future research can focus on how landscape maintenance management affects landscape quality.

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